

=> FIL REG

FILE 'REGISTRY' ENTERED AT 10:24:44 ON 25 OCT 2010
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=> D HIS NOFILE

FILE 'HCA' ENTERED AT 08:21:36 ON 25 OCT 2010
E US2007-551576/APPS

L1 1 SEA SPE=ON ABB=ON PLU=ON US2007-551576/AP
SEL L1 RN

FILE 'REGISTRY' ENTERED AT 08:21:46 ON 25 OCT 2010

L2 4 SEA SPE=ON ABB=ON PLU=ON (124949-97-9/B I OR 361482-41-
9/B I OR 775342-45-5/B I OR 7664-93-9/B I)

FILE 'HCA' ENTERED AT 08:21:53 ON 25 OCT 2010
SEL L1 AU

L3 78 SEA SPE=ON ABB=ON PLU=ON ("CHARNOCK, PETER"/AU OR
"DEVINE, JOHN NEIL"/AU OR "WILSON, BRIAN"/AU)
SEL L1 PA

L4 40 SEA SPE=ON ABB=ON PLU=ON "VICTREX MANUFACTURING
LIMITED UK"/PA

FILE 'REGISTRY' ENTERED AT 08:22:15 ON 25 OCT 2010
ACT WEI576/A

L5 SCR 2043
L6 STR
L7 72693 SEA SSS FUL L6 AND L5

ACT WEI576A/A

L8 SCR 2043
L9 STR
L10 (72693) SEA SSS FUL L9 AND L8
L11 STR
L12 14752 SEA SUB=L10 SSS FUL L11

ACT WEI576C/A

L13 SCR 2043
L14 STR
L15 (72693) SEA SSS FUL L14 AND L13
L16 STR
L17 241 SEA SUB=L15 SSS FUL L16

ACT WEI576B/A

L18 SCR 2043
L19 STR
L20 (72693) SEA SSS FUL L19 AND L18
L21 STR
L22 14541 SEA SUB=L20 SSS FUL L21

ACT WEI576D/A

L23 SCR 2043

October 25, 2010

10/551,576

2

L24 STR
L25 (72693) SEA SSS FUL L24 AND L23
L26 STR
L27 205 SEA SUB=L25 SSS FUL L26

ACT WEI576E/A

L28 SCR 2043
L29 STR
L30 (72693) SEA SSS FUL L29 AND L28
L31 STR
L32 13283 SEA SUB=L30 SSS FUL L31

ACT WEI576F/Q

L33 STR

L34 50 SEA SUB=L7 SSS SAM L33
L35 STR L33
L36 50 SEA SUB=L7 SSS SAM L35
L37 4081 SEA SUB=L7 SSS FUL L35

SAV L37 WEI576F/A
E SULFURIC ACID/CN

L38 1 SEA SPE=ON ABB=ON PLU=ON "SULFURIC ACID"/CN
L39 14511 SEA SPE=ON ABB=ON PLU=ON L12 NOT L17
L40 14336 SEA SPE=ON ABB=ON PLU=ON L22 NOT L27
L41 17 SEA SPE=ON ABB=ON PLU=ON L34 AND (L39 OR L40)
L42 1 SEA SPE=ON ABB=ON PLU=ON L34 AND (L17 OR L27)
L43 1801 SEA SPE=ON ABB=ON PLU=ON L37 AND (L39 OR L40)
L44 39 SEA SPE=ON ABB=ON PLU=ON L37 AND (L17 OR L27)

FILE 'HCA' ENTERED AT 08:48:33 ON 25 OCT 2010

L45 QUE SPE=ON ABB=ON PLU=ON ?SULPHONAT? OR ?SULFONAT?
L46 1013826 SEA SPE=ON ABB=ON PLU=ON ?MEMBRAN?
L47 1044725 SEA SPE=ON ABB=ON PLU=ON ANOD#### OR CATHOD#### OR
ELECTROD####

L48 1997077 SEA SPE=ON ABB=ON PLU=ON L46 OR L47
L49 330 SEA SPE=ON ABB=ON PLU=ON L39 (L) L45
L50 138 SEA SPE=ON ABB=ON PLU=ON L17
L51 830 SEA SPE=ON ABB=ON PLU=ON L40 (L) L45
L52 63 SEA SPE=ON ABB=ON PLU=ON L27
L53 1 SEA SPE=ON ABB=ON PLU=ON L41 (L) L45
L54 1 SEA SPE=ON ABB=ON PLU=ON L42
L55 33 SEA SPE=ON ABB=ON PLU=ON L43 (L) L45
L56 27 SEA SPE=ON ABB=ON PLU=ON L44
L57 QUE SPE=ON ABB=ON PLU=ON ?CRYST?
L58 135 SEA SPE=ON ABB=ON PLU=ON L48 AND L49
L59 63 SEA SPE=ON ABB=ON PLU=ON L48 AND L50
L60 691 SEA SPE=ON ABB=ON PLU=ON L48 AND L51
L61 42 SEA SPE=ON ABB=ON PLU=ON L48 AND L52
L62 1 SEA SPE=ON ABB=ON PLU=ON L48 AND L53
L63 1 SEA SPE=ON ABB=ON PLU=ON L48 AND L54
L64 24 SEA SPE=ON ABB=ON PLU=ON L48 AND L55
L65 19 SEA SPE=ON ABB=ON PLU=ON L48 AND L56
L66 28 SEA SPE=ON ABB=ON PLU=ON (L58 OR L59 OR L60 OR L61)
AND L57

L67 142802 SEA SPE=ON ABB=ON PLU=ON L38
L68 77 SEA SPE=ON ABB=ON PLU=ON (L58 OR L59 OR L60 OR L61)
AND L67
L69 886 SEA SPE=ON ABB=ON PLU=ON L58 OR L59 OR L60 OR L61 OR

L62 OR L63 OR L64 OR L65 OR L66 OR L68
 L70 5 SEA SPE=ON ABB=ON PLU=ON L69 AND (L3 OR L4)
 L71 881 SEA SPE=ON ABB=ON PLU=ON L69 NOT L70
 L72 298 SEA SPE=ON ABB=ON PLU=ON 1802-2004/PY,PRY,AY AND L71
 L73 105803 SEA SPE=ON ABB=ON PLU=ON FUEL? (2A) CELL?
 L74 166 SEA SPE=ON ABB=ON PLU=ON L72 AND L73

FILE 'REGISTRY' ENTERED AT 09:21:14 ON 25 OCT 2010
 ACT WEI576E/A

 L75 SCR 2043
 L76 STR
 L77 (72693)SEA SSS FUL L76 AND L75
 L78 STR
 L79 13283 SEA SUB=L77 SSS FUL L78

L80 3127 SEA SPE=ON ABB=ON PLU=ON L79 AND (L39 OR L40)
 L81 230 SEA SPE=ON ABB=ON PLU=ON L79 AND (L17 OR L27)

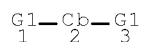
FILE 'HCA' ENTERED AT 09:24:00 ON 25 OCT 2010

L82 865 SEA SPE=ON ABB=ON PLU=ON L80 (L) L45
 L83 96 SEA SPE=ON ABB=ON PLU=ON L81
 L84 726 SEA SPE=ON ABB=ON PLU=ON L48 AND L82
 L85 78 SEA SPE=ON ABB=ON PLU=ON L48 AND L83
 L86 886 SEA SPE=ON ABB=ON PLU=ON L58 OR L59 OR L60 OR L61 OR
 L64 OR L65 OR L84 OR L85 OR L66 OR L68
 L87 5 SEA SPE=ON ABB=ON PLU=ON L86 AND (L3 OR L4)
 L88 881 SEA SPE=ON ABB=ON PLU=ON L86 NOT L87
 L89 298 SEA SPE=ON ABB=ON PLU=ON 1802-2004/PY,PRY,AY AND L88
 L90 166 SEA SPE=ON ABB=ON PLU=ON L89 AND L73
 L91 155 SEA SPE=ON ABB=ON PLU=ON (L84 OR L85) AND L90
 L92 155 SEA SPE=ON ABB=ON PLU=ON L91 NOT L87
 L93 11 SEA SPE=ON ABB=ON PLU=ON (L64 OR L65) AND L90
 L94 11 SEA SPE=ON ABB=ON PLU=ON L93 NOT L87
 L95 5 SEA SPE=ON ABB=ON PLU=ON L66 AND L90
 L96 5 SEA SPE=ON ABB=ON PLU=ON L95 NOT L87
 L97 21 SEA SPE=ON ABB=ON PLU=ON L68 AND L90
 L98 21 SEA SPE=ON ABB=ON PLU=ON L97 NOT L87
 L99 166 SEA SPE=ON ABB=ON PLU=ON (L58 OR L59 OR L60 OR L61)
 AND L90
 L100 9 SEA SPE=ON ABB=ON PLU=ON L99 NOT (L98 OR L96 OR L94
 OR L92)
 SEL L92 11 21 31 41 51 61 71 81 91 101 111 121 131 141 15
 L101 15 SEA SPE=ON ABB=ON PLU=ON ("130:82473"/AN OR "133:13781
 9"/AN OR "136:121088"/AN OR "137:110259"/AN OR "138:17327
 4"/AN OR "139:215541"/AN OR "139:367516"/AN OR "140:14901
 0"/AN OR "140:409513"/AN OR "141:280351"/AN OR "142:17788
 7"/AN OR "143:17776"/AN OR "143:250965"/AN OR "144:111204
 "/AN OR "144:394674"/AN)
 L102 15 SEA SPE=ON ABB=ON PLU=ON L92 AND L101
 L103 140 SEA SPE=ON ABB=ON PLU=ON L92 NOT L102
 SAV L103 WEI576G/A

FILE 'REGISTRY' ENTERED AT 10:24:44 ON 25 OCT 2010

=> D L12 QUE STAT

L8 SCR 2043
 L9 STR



VAR G1=O/S

NODE ATTRIBUTES:

DEFAULT MLEVEL IS ATOM

GGCAT IS UNS AT 2

DEFAULT ECLEVEL IS LIMITED

ECOUNT IS E6 C AT 2

GRAPH ATTRIBUTES:

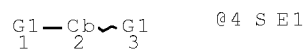
RING(S) ARE ISOLATED OR EMBEDDED

NUMBER OF NODES IS 3

STEREO ATTRIBUTES: NONE

L10 (72693)SEA FILE=REGISTRY SSS FUL L9 AND L8

L11 STR



VAR G1=OH/4

NODE ATTRIBUTES:

HCOUNT IS E1 AT 4

CONNECT IS E1 RC AT 4

DEFAULT MLEVEL IS ATOM

GGCAT IS UNS AT 2

DEFAULT ECLEVEL IS LIMITED

ECOUNT IS E6 C AT 2

GRAPH ATTRIBUTES:

RING(S) ARE ISOLATED OR EMBEDDED

NUMBER OF NODES IS 4

STEREO ATTRIBUTES: NONE

L12 14752 SEA FILE=REGISTRY SUB=L10 SSS FUL L11

100.0% PROCESSED 72693 ITERATIONS

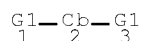
14752 ANSWERS

SEARCH TIME: 00.00.01

=> D L17 QUE STAT

L13 SCR 2043

L14 STR



VAR G1=O/S

NODE ATTRIBUTES:

DEFAULT MLEVEL IS ATOM

October 25, 2010

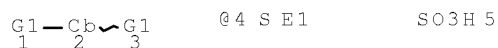
10/551,576

5

GGCAT IS UNS AT 2
DEFAULT ECLEVEL IS LIMITED
ECOUNT IS E6 C AT 2

GRAPH ATTRIBUTES:
RING(S) ARE ISOLATED OR EMBEDDED
NUMBER OF NODES IS 3

STEREO ATTRIBUTES: NONE
L15 (72693)SEA FILE=REGISTRY SSS FUL L14 AND L13
L16 STR



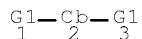
VAR G1=OH/4
NODE ATTRIBUTES:
HCOUNT IS E1 AT 4
CONNECT IS E1 RC AT 4
DEFAULT MLEVEL IS ATOM
GGCAT IS UNS AT 2
DEFAULT ECLEVEL IS LIMITED
ECOUNT IS E6 C AT 2

GRAPH ATTRIBUTES:
RING(S) ARE ISOLATED OR EMBEDDED
NUMBER OF NODES IS 5

STEREO ATTRIBUTES: NONE
L17 241 SEA FILE=REGISTRY SUB=L15 SSS FUL L16

100.0% PROCESSED 4339 ITERATIONS 241 ANSWERS
SEARCH TIME: 00.00.01

=> D L22 QUE STAT
L18 SCR 2043
L19 STR



VAR G1=O/S
NODE ATTRIBUTES:
DEFAULT MLEVEL IS ATOM
GGCAT IS UNS AT 2
DEFAULT ECLEVEL IS LIMITED
ECOUNT IS E6 C AT 2

GRAPH ATTRIBUTES:
RING(S) ARE ISOLATED OR EMBEDDED
NUMBER OF NODES IS 3

STEREO ATTRIBUTES: NONE
L20 (72693)SEA FILE=REGISTRY SSS FUL L19 AND L18

October 25, 2010

10/551,576

6

L21

STR



VAR G1=4/O

VAR G2=4/6/O

NODE ATTRIBUTES:

HCOUNT IS E1 AT 6

CONNECT IS E2 RC AT 4

CONNECT IS E1 RC AT 6

DEFAULT MLEVEL IS ATOM

GGCAT IS UNS AT 1

GGCAT IS UNS AT 3

DEFAULT ECLEVEL IS LIMITED

ECOUNT IS E6 C AT 1

GRAPH ATTRIBUTES:

RING(S) ARE ISOLATED OR EMBEDDED

NUMBER OF NODES IS 6

STEREO ATTRIBUTES: NONE

L22 14541 SEA FILE=REGISTRY SUB=L20 SSS FUL L21

100.0% PROCESSED 72693 ITERATIONS

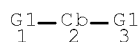
14541 ANSWERS

SEARCH TIME: 00.00.01

=> D L27 QUE STAT

L23 SCR 2043

L24 STR



VAR G1=O/S

NODE ATTRIBUTES:

DEFAULT MLEVEL IS ATOM

GGCAT IS UNS AT 2

DEFAULT ECLEVEL IS LIMITED

ECOUNT IS E6 C AT 2

GRAPH ATTRIBUTES:

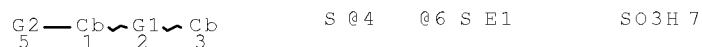
RING(S) ARE ISOLATED OR EMBEDDED

NUMBER OF NODES IS 3

STEREO ATTRIBUTES: NONE

L25 (72693)SEA FILE=REGISTRY SSS FUL L24 AND L23

L26 STR



VAR G1=4/O

VAR G2=4/6/O

NODE ATTRIBUTES:

HCOUNT IS E1 AT 6

CONNECT IS E2 RC AT 4

CONNECT IS E1 RC AT 6

DEFAULT MLEVEL IS ATOM

GGCAT IS UNS AT 1

GGCAT IS UNS AT 3

DEFAULT ECLEVEL IS LIMITED

ECOUNT IS E6 C AT 1

GRAPH ATTRIBUTES:

RING(S) ARE ISOLATED OR EMBEDDED

NUMBER OF NODES IS 7

STEREO ATTRIBUTES: NONE

L27 205 SEA FILE=REGISTRY SUB=L25 SSS FUL L26

100.0% PROCESSED 4339 ITERATIONS

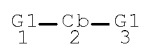
205 ANSWERS

SEARCH TIME: 00.00.01

=> D L79 QUE STAT

L75 SCR 2043

L76 STR



VAR G1=O/S

NODE ATTRIBUTES:

DEFAULT MLEVEL IS ATOM

GGCAT IS UNS AT 2

DEFAULT ECLEVEL IS LIMITED

ECOUNT IS E6 C AT 2

GRAPH ATTRIBUTES:

RING(S) ARE ISOLATED OR EMBEDDED

NUMBER OF NODES IS 3

STEREO ATTRIBUTES: NONE

L77 (72693)SEA FILE=REGISTRY SSS FUL L76 AND L75

L78 STR



VAR G1=5/7

NODE ATTRIBUTES:

DEFAULT MLEVEL IS ATOM

GGCAT IS UNS AT 1

GGCAT IS UNS AT 3

DEFAULT ECLEVEL IS LIMITED

October 25, 2010

10/551,576

8

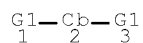
ECOUNT IS E6 C AT 1
ECOUNT IS E6 C AT 3

GRAPH ATTRIBUTES:
RING(S) ARE ISOLATED OR EMBEDDED
NUMBER OF NODES IS 8

STEREO ATTRIBUTES: NONE
L79 13283 SEA FILE=REGISTRY SUB=L77 SSS FUL L78

100.0% PROCESSED 53556 ITERATIONS 13283 ANSWERS
SEARCH TIME: 00.00.01

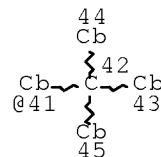
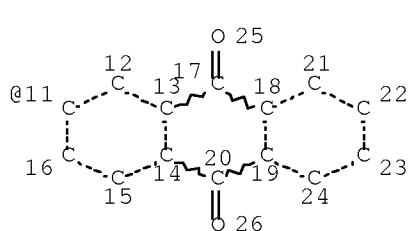
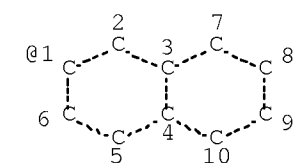
=> D L37 QUE STAT
L5 SCR 2043
L6 STR



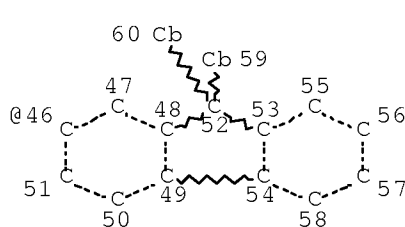
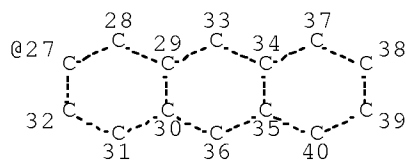
VAR G1=O/S
NODE ATTRIBUTES:
DEFAULT MLEVEL IS ATOM
GGCAT IS UNS AT 2
DEFAULT ECLEVEL IS LIMITED
ECOUNT IS E6 C AT 2

GRAPH ATTRIBUTES:
RING(S) ARE ISOLATED OR EMBEDDED
NUMBER OF NODES IS 3

STEREO ATTRIBUTES: NONE
L7 72693 SEA FILE=REGISTRY SSS FUL L6 AND L5
L35 STR



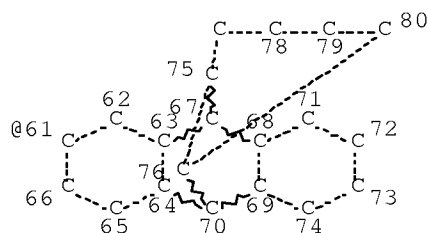
G1 8



Page 1-A

1

Page 1-B



Page 2-A

VAR G1=1/11/41/27/46/61

NODE ATTRIBUTES:

DEFAULT MLEVEL IS ATOM

MLEVEL IS CLASS AT 77 78 79 80

GGCAT IS UNS AT 41

GGCAT IS UNS AT 43

GGCAT IS UNS AT 44

GGCAT IS UNS AT 45

GGCAT IS UNS AT 59

GGCAT IS UNS AT 60

DEFAULT ECLEVEL IS LIMITED

ECOUNT IS UNLIMITED AT 77 78 79 80

ECOUNT IS E6 C AT 41

ECOUNT IS E6 C AT 43

ECOUNT IS E6 C AT 44

ECOUNT IS E6 C AT 45

ECOUNT IS E6 C AT 59

ECOUNT IS E6 C AT 60

GRAPH ATTRIBUTES:

RSPEC I

NUMBER OF NODES IS 81

STEREO ATTRIBUTES: NONE

L37 4081 SEA FILE=REGISTRY SUB=L7 SSS FUL L35

100.0% PROCESSED 72693 ITERATIONS

4081 ANSWERS

SEARCH TIME: 00.00.01

=> FIL HCA

FILE 'HCA' ENTERED AT 10:25:57 ON 25 OCT 2010

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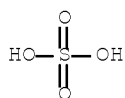
----- (APPLICANTS) -----

=> D L87 1-5 IBIB ABS HITSTR HITIND RETABLE

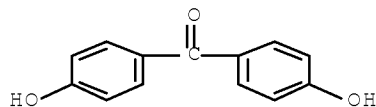
L87 ANSWER 1 OF 5 HCA COPYRIGHT 2010 ACS on STN
 ACCESSION NUMBER: 141:352743 HCA Full-text
 TITLE: Polymer electrolyte ~~membrane~~ or gas
 diffusion electrode for fuel cells
 INVENTOR(S): Charnock, Peter; Devine, John
 Neil; Wilson, Brian
 PATENT ASSIGNEE(S): Victrex Manufacturing Limited, UK
 SOURCE: PCT Int. Appl., 51 pp.
 CODEN: PIXXD2
 DOCUMENT TYPE: Patent
 LANGUAGE: English
 FAMILY ACC. NUM. COUNT: 1
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2004088778	A2	20041014	WO 2004-GB1401	20040401
WO 2004088778	A3	20050616		
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW				
RW: BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
AU 2004226638	A1	20041014	AU 2004-226638	20040401
AU 2004226638	B2	20100909		
CA 2520650	A1	20041014	CA 2004-2520650	20040401
EP 1614170	A2	20060111	EP 2004-725090	20040401
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, PL, SK, HR				
JP 2006524415	T	20061026	JP 2006-506066	20040401
US 20070269700	A1	20071122	US 2007-551576	20070410
PRIORITY APPLN. INFO.:			GB 2003-7623	A
				20030402

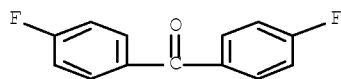
- AB A polymer electrolyte ~~membrane~~ or gas diffusion ~~electrode~~ includes an ion-conducting polymeric material which includes moieties of formula $-X-m-C_6H_4-X-$ which are substituted on average with more than 1 and 3 or fewer groups (e.g. sulfonate groups) which provide ion-exchange sites and hydrogen atoms of the moieties are optionally substituted, wherein each X in the moieties of formula are independently represent an oxygen or sulfur atom. The ion conducting polymeric material is suitably prepared by controllably sulfonating a polymeric material using about 100% sulfuric acid at 34° to 36°.
- IT 7664-93-9, Sulfuric acid, processes
(polymer electrolyte ~~membrane~~ or gas diffusion
~~electrode~~ for fuel cells)
- RN 7664-93-9 HCA
- CN Sulfuric acid (CA INDEX NAME)



- IT 124949-97-9DP, sulfonated 775342-45-5DP,
sulfonated
(polymer electrolyte ~~membrane~~ or gas diffusion
~~electrode~~ for fuel cells)
- RN 124949-97-9 HCA
- CN Methanone, bis(4-fluorophenyl)-, polymer with 1,3-benzenediol and
bis(4-hydroxyphenyl)methanone (CA INDEX NAME)
- CM 1
- CRN 611-99-4
- CMF C13 H10 O3



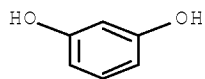
- CM 2
- CRN 345-92-6
- CMF C13 H8 F2 O



CM 3

CRN 108-46-3

CMF C6 H6 O2



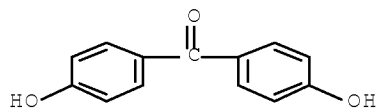
RN 775342-45-5 HCA

CN Methanone, bis(4-fluorophenyl)-, polymer with 1,3-benzenediol,
bis(4-hydroxyphenyl)methanone and 4,4'-sulfonylbis[phenol] (9CI)
(CA INDEX NAME)

CM 1

CRN 611-99-4

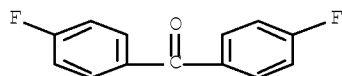
CMF C13 H10 O3



CM 2

CRN 345-92-6

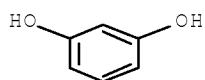
CMF C13 H8 F2 O



CM 3

CRN 108-46-3

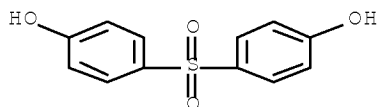
CMF C6 H6 O2



CM 4

CRN 80-09-1

CMF C12 H10 O4 S



IPCI H01M0008-00 [ICM,7]
 IPCR B01D0071-00 [I,C*]; B01D0071-52 [I,A]; B01D0071-68 [I,A];
 B01D0071-82 [I,A]; C08G0065-00 [I,C*]; C08G0065-48 [I,A];
 C08G0075-00 [I,C*]; C08G0075-23 [I,A]; C08J0005-20 [I,C*];
 C08J0005-22 [I,A]; H01M0004-86 [I,C*]; H01M0004-86 [I,A];
 H01M0008-10 [I,C*]; H01M0008-10 [I,A]
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 Section cross-reference(s): 38
 ST fuel cell polymer electrolyte membrane gas diffusion
 electrode
 IT Fuel cell electrodes
 (gas diffusion; polymer electrolyte membrane or gas
 diffusion electrode for fuel cells)
 IT Polyketones
 (polyether-, sulfonated; polymer electrolyte membrane
 or gas diffusion electrode for fuel cells)
 IT Polysulfones, uses
 (polyether-polyketone-; polymer electrolyte membrane or
 gas diffusion electrode for fuel cells)
 IT Polyketones
 (polyether-polysulfone-; polymer electrolyte membrane
 or gas diffusion electrode for fuel cells)
 IT Polyethers, preparation
 (polyketone-, sulfonated; polymer electrolyte membrane
 or gas diffusion electrode for fuel cells)
 IT Polyethers, uses
 (polyketone-polysulfone-; polymer electrolyte membrane
 or gas diffusion electrode for fuel cells)
 IT Conducting polymers
 Fuel cell electrolytes
 Sulfonation
 (polymer electrolyte membrane or gas diffusion
 electrode for fuel cells)
 IT Fuel cells
 (polymer electrolyte; polymer electrolyte membrane or
 gas diffusion electrode for fuel cells)
 IT 7664-93-9, Sulfuric acid, processes
 (polymer electrolyte membrane or gas diffusion
 electrode for fuel cells)
 IT 124949-97-9DP, sulfonated 124949-97-9P
 361482-41-9DP, sulfonated 361482-41-9P 775342-45-5DP,
 sulfonated 775342-45-5P
 (polymer electrolyte membrane or gas diffusion
 electrode for fuel cells)

RETABLE

Referenced Author	Year	VOL	PG	Referenced Work
Referenced				

(RAU)	(RPY)	(RVL)	(RPG)	(RWK)	File
=====					
==					
Anon				WO 0119896 A1	HCA
Anon				EP 0382440 A1	HCA
Anon				US 4273903 A	HCA
Anon				US 5362836 A	HCA
OS.CITING REF COUNT: 1 THERE ARE 1 CAPLUS RECORDS THAT CITE THIS RECORD (1 CITINGS)					

L87 ANSWER 2 OF 5 HCA COPYRIGHT 2010 ACS on STN
 ACCESSION NUMBER: 138:274118 HCA Full-text
 TITLE: Electrochemical cells
 INVENTOR(S): Devine, John Neil; Wilson, Brian
 PATENT ASSIGNEE(S): Victrex Manufacturing Limited, UK
 SOURCE: PCT Int. Appl., 34 pp.
 CODEN: PIXXD2
 DOCUMENT TYPE: Patent
 LANGUAGE: English
 FAMILY ACC. NUM. COUNT: 1
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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WO 2003028139	A2	20030403	WO 2002-GB4242	20020918
WO 2003028139	A3	20040401		
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RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
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AU 2002329405	A1	20030407	AU 2002-329405	20020918
AU 2002329405	B2	20080501		
EP 1430559	A2	20040623	EP 2002-765031	20020918
EP 1430559	B1	20070530		
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JP 2005504421	T	20050210	JP 2003-531548	20020918
AT 363740	T	20070615	AT 2002-765031	20020918

October 25, 2010

10/551,576

15

US 20040258999	A1	20041223	US 2004-490422	
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US 7799465	B2	20100921		
PRIORITY APPLN. INFO.:			GB 2001-23109	A 200109 26
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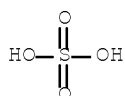
ASSIGNMENT HISTORY FOR US PATENT AVAILABLE IN LSUS DISPLAY FORMAT

AB There is described a fuel cell or electrolytic cell comprising an ion-conductive polymeric material which includes a first repeat unit of formula : - (O-Ph1-CO-Ph1-O-Ph1-CO-Ph1) -, and a second repeat unit of formula : - (O-Ph2-O-Ph3-CO-Ph4) -, or of formula : (O-Ph2-O-Ph3-SO2-Ph4) -; wherein Ph1, Ph2, Ph3 and Ph4 independently represent Ph moieties and wherein the second repeat unit is provided with ion-exchange sites. The polymeric material may include a third repeat unit which is amorphous.

IT 7664-93-9, Sulfuric acid, processes
(electrochem. cells)

RN 7664-93-9 HCA

CN Sulfuric acid (CA INDEX NAME)



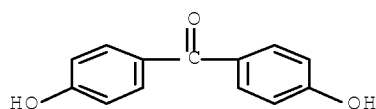
IT 71957-60-3DP, 4,4'-Difluorobenzophenone-4,4'-dihydroxybenzophenone-hydroquinone copolymer, sulfonated
503540-87-2DP, 4,4'-Difluorobenzophenone-4,4'-dihydroxybenzophenone-diphenyl sulfone-hydroquinone copolymer, sulfonated
503540-89-4DP, 4,4'-Difluorobenzophenone-4,4'-dihydroxybenzophenone-4,4'-dihydroxydiphenyl sulfone-diphenyl sulfone-hydroquinone copolymer, sulfonated
(electrochem. cells)

RN 71957-60-3 HCA

CN Methanone, bis(4-fluorophenyl)-, polymer with 1,4-benzenediol and bis(4-hydroxyphenyl)methanone (CA INDEX NAME)

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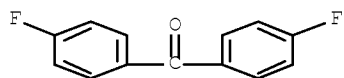
CRN 611-99-4
CMF C13 H10 O3



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CRN 345-92-6

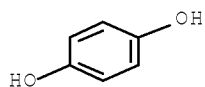
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CM 3

CRN 123-31-9

CMF C6 H6 O2



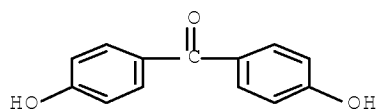
RN 503540-87-2 HCA

CN Methanone, bis(4-fluorophenyl)-, polymer with 1,4-benzenediol,
bis(4-hydroxyphenyl)methanone and 1,1'-sulfonylbis[benzene] (9CI)
(CA INDEX NAME)

CM 1

CRN 611-99-4

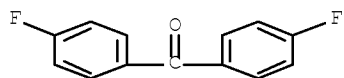
CMF C13 H10 O3



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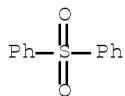
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CMF C13 H8 F2 O



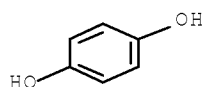
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CRN 127-63-9
CMF C12 H10 O2 S



CM 4

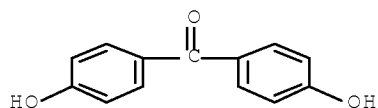
CRN 123-31-9
CMF C6 H6 O2



RN 503540-89-4 HCA
CN Methanone, bis(4-fluorophenyl)-, polymer with 1,4-benzenediol,
bis(4-hydroxyphenyl)methanone, 1,1'-sulfonylbis[benzene] and
4,4'-sulfonylbis[phenol] (9CI) (CA INDEX NAME)

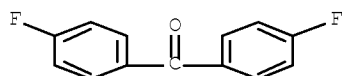
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CRN 611-99-4
CMF C13 H10 O3



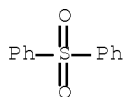
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CRN 345-92-6
CMF C13 H8 F2 O



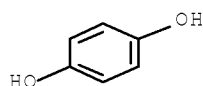
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CRN 127-63-9
CMF C12 H10 O2 S



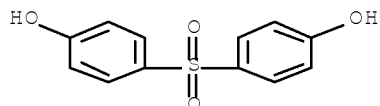
CM 4

CRN 123-31-9
CMF C6 H6 O2



CM 5

CRN 80-09-1
CMF C12 H10 O4 S



IPCI H01M0008-10 [ICM, 7]
 IPCR C08J0005-20 [I,C*]; C08J0005-22 [I,A]; B01D0071-00 [I,C*];
 B01D0071-00 [I,A]; C08G0065-00 [I,C*]; C08G0065-40 [I,A];
 C25B0009-00 [I,C*]; C25B0009-00 [I,A]; H01B0001-06 [I,C*];
 H01B0001-06 [I,A]; H01B0001-12 [I,C*]; H01B0001-12 [I,A];
 H01M0002-16 [I,C*]; H01M0002-16 [I,A]; H01M0008-02 [I,C*];
 H01M0008-02 [I,A]; H01M0008-10 [I,C*]; H01M0008-10 [I,A]
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 Section cross-reference(s): 38, 72
 IT 7664-93-9, Sulfuric acid, processes
 (electrochem. cells)
 IT 71957-60-3DP, 4,4'-Difluorobenzophenone-4,4'-
 dihydroxybenzophenone-hydroquinone copolymer, sulfonated
 503540-87-2DP, 4,4'-Difluorobenzophenone-4,4'-
 dihydroxybenzophenone-diphenyl sulfone-hydroquinone copolymer,
 sulfonated 503540-89-4DP,
 4,4'-Difluorobenzophenone-4,4'-dihydroxybenzophenone-4,4'-
 dihydroxydiphenyl sulfone-diphenyl sulfone-hydroquinone copolymer,
 sulfonated
 (electrochem. cells)
 IT 7732-18-5, Water, processes

(uptake, of polymer ~~membranes~~; electrochem. cells)

RETABLE

Referenced Author Referenced	Year	VOL	PG	Referenced Work	
(RAU)	(RPY)	(RVL)	(RPG)	(RWK)	File
=====	+	+	+	+	=====
==					
Anon				US 4268650 A	HCA
Anon				US 4273903 A	HCA
Anon				US 4320224 A	HCA
Anon				US 4413106 A	HCA
Anon				US 4419486 A	HCA

L87 ANSWER 3 OF 5 HCA COPYRIGHT 2010 ACS on STN
 ACCESSION NUMBER: 137:265674 HCA Full-text
 TITLE: Fuel cell powered by direct fuel
 INVENTOR(S): Andrews, Mark James; Lockley, John Edward;
 Wilson, Brian
 PATENT ASSIGNEE(S): Victrex Manufacturing Limited, UK
 SOURCE: PCT Int. Appl., 72 pp.
 CODEN: PIXXD2
 DOCUMENT TYPE: Patent
 LANGUAGE: English
 FAMILY ACC. NUM. COUNT: 1
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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WO 2002075835	A2	20020926	WO 2002-GB1379	200203 21
WO 2002075835	A3	20031016		
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RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
CA 2440964	A1	20020926	CA 2002-2440964	200203 21
AU 2002241152	A1	20021003	AU 2002-241152	200203 21
AU 2002241152	B2	20080228		
EP 1374330	A2	20040102	EP 2002-706992	200203 21
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR				
JP 2004528683	T	20040916	JP 2002-574147	200203 21
US 20040157102	A1	20040812	US 2004-472227	200404

US 7303830	B2	20071204		06
PRIORITY APPLN. INFO.:			GB 2001-7075	A
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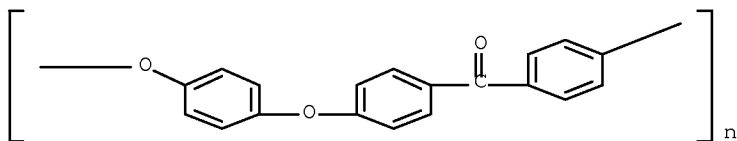
ASSIGNMENT HISTORY FOR US PATENT AVAILABLE IN LSUS DISPLAY FORMAT

AB A fuel cell powered by direct fuel, for example a direct methanol fuel cell, includes a polymer electrolyte ~~membrane~~ which includes a ~~semicryst.~~ polymer. Preferred ~~semicryst.~~ polymers include first repeat units comprising sulfonated aromatic group containing moieties linked by -SO₂- and/or -CO- and/or -Q- groups, where Q is O or S and second repeat units which include aromatic group containing moieties linked by -CO- and/or Q groups.

IT ~~31694-16-3DP~~, PEEK 450P, ~~sulfonated~~
(fuel cell powered by direct fuel)

RN 31694-16-3 HCA

CN Poly(oxy-1,4-phenyleneoxy-1,4-phenylenecarbonyl-1,4-phenylene) (CA INDEX NAME)



IPCI H01M0008-10 [ICM,7]; B01D0071-06 [ICS,7]; B01D0071-00 [ICS,7,C*];
C08G0065-48 [ICS,7]; C08G0065-00 [ICS,7,C*]; C08J0005-22 [ICS,7];
C08J0005-20 [ICS,7,C*]; H01B0001-12 [ICS,7]

IPCR H01M0008-02 [I,C*]; H01M0008-02 [I,A]; B01D0067-00 [I,C*];
B01D0067-00 [I,A]; B01D0071-00 [I,C*]; B01D0071-52 [I,A];
B01D0071-68 [I,A]; C08G0065-00 [I,C*]; C08G0065-40 [I,A];
C08L0071-00 [I,C*]; C08L0071-00 [I,A]; C08L0081-00 [I,C*];
C08L0081-06 [I,A]; H01B0001-12 [I,C*]; H01B0001-12 [I,A];
H01M0008-10 [I,C*]; H01M0008-10 [I,A]

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

IT Crystallinity
Fuel cell electrolytes
(fuel cell powered by direct fuel)

IT Polymers, uses
(~~semicryst.~~, sulfonated; fuel cell powered by direct
fuel)

IT 27380-27-4DP, sulfonated ~~31694-16-3DP~~, PEEK 450P,
~~sulfonated~~ 128324-23-2DP,
4,4'-Difluorobenzophenone-4,4'-dihydroxybiphenyl-4,4'-
dihydroxybenzophenone copolymer, sulfonated 128324-23-2P,
4,4'-Difluorobenzophenone-4,4'-dihydroxybenzophenone-4,4'-
dihydroxybiphenyl copolymer 128324-24-3DP,
4,4'-Difluorobenzophenone-4,4'-dihydroxybiphenyl-4,4'-

dihydroxydiphenylsulfone copolymer, sulfonated 128324-24-3P,
4,4'-Difluorobenzophenone-4,4'-dihydroxybiphenyl-4,4'-
dihydroxydiphenylsulfone copolymer 361482-41-9DP,
4,4'-Difluorobenzophenone-4,4'-dihydroxybenzophenone-4,4'-
dihydroxybiphenyl-4,4'-dihydroxydiphenylsulfone copolymer,
sulfonated 361482-41-9P, 4,4'-Difluorobenzophenone-4,4'-
dihydroxybenzophenone-4,4'-dihydroxybiphenyl-4,4'-
dihydroxydiphenylsulfone copolymer 361482-42-0DP,
4,4'-Difluorobenzophenone-2,4'-dihydroxybenzophenone-4,4'-
dihydroxybenzophenone-4,4'-dihydroxybiphenyl copolymer, sulfonated
361482-42-0P, 4,4'-Difluorobenzophenone-2,4'-dihydroxybenzophenone-
4,4'-dihydroxybenzophenone 4,4'-dihydroxybiphenyl copolymer
362518-55-6P 362518-57-8P

(fuel cell powered by direct fuel)

RETABLE

Referenced Author Referenced (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	 File
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=====+=====+=====+=====+=====+=====

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Anon				WO 0015691 A1	HCA
Anon				WO 0170857 A2	HCA
Anon				WO 0171839 A2	HCA
Anon				EP 0688824 A2	HCA
Anon				DE 19847782 A1	HCA
Anon				WO 9629752 A1	HCA
Anon				WO 9719480 A1	HCA
Anon				WO 9822989 A1	HCA
Anon				WO 9850457 A1	HCA

OS.CITING REF COUNT: 4 THERE ARE 4 CAPLUS RECORDS THAT CITE THIS
RECORD (4 CITINGS)

L87	ANSWER 4 OF 5	HCA	COPYRIGHT 2010 ACS on STN
ACCESSION NUMBER:	135:243473	HCA	<u>Full-text</u>
TITLE:	Preparation of ion conducting polymers and composite electrolyte membrane therefrom		
INVENTOR(S):	Charnock, Peter; Wilson, Brian ; Bridges, Richard Frank		
PATENT ASSIGNEE(S):	Victrex Manufacturing Limited, UK		
SOURCE:	PCT Int. Appl., 63 pp. CODEN: PIXXD2		
DOCUMENT TYPE:	Patent		
LANGUAGE:	English		
FAMILY ACC. NUM. COUNT:	1		
PATENT INFORMATION:			

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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WO 2001070858	A2	20010927	WO 2001-GB1243	200103 21

WO	2001070858	A3	20011227
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RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH,
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TR, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD,
TG

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				200103 21
CA 2402840	C	20101005		
AU 2001039406	A	20011003	AU 2001-39406	
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EP 1268619	A2	20030102	EP 2001-914017	
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US 20040005474	A1	20040108	US 2002-239143	
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US 6902801	B2	20050607		
PRIORITY APPLN. INFO.:			GB 2000-6883	A
				200003 22
			GB 2000-31209	A
				200012 21
			WO 2001-GB1243	W
				200103 21

AB A composite material, for example a composite ~~membrane~~ for a polymer electrolyte ~~membrane~~ fuel cell includes a first conductive polymer and a support material for the polymer, wherein the support material comprises a second conductive polymer. A method making of the composite material is also disclosed as is its use as a polymer electrolyte ~~membrane~~ in a fuel cell. Thus, a microporous ion conducting ~~membrane~~ prepared by casting a solution containing a 1:1 blend of polyetherketone and a sulfonated copolymer of 4,4'-difluorobenzophenone, 4,4'-dihydroxybenzophenone, and 4,4'-dihydroxybiphenyl was impregnated with a 15% solution of a sulfonated copolymer of 4,4'-difluorobenzophenone, 4,4'-dihydroxybiphenyl, and 4,4'-dihydroxydiphenylsulfone and the composite ~~membrane~~ was strong and flexible.

IT 71957-60-3DP, 4,4'-Difluorobenzophenone-4,4'-dihydroxybenzophenone-hydroquinone copolymer, ~~sulfonated~~
(preparation of ion conducting polymers for composite electrolyte ~~membrane~~)

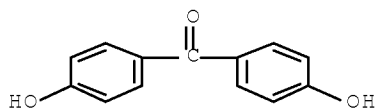
RN 71957-60-3 HCA

CN Methanone, bis(4-fluorophenyl)-, polymer with 1,4-benzenediol and bis(4-hydroxyphenyl)methanone (CA INDEX NAME)

CM 1

CRN 611-99-4

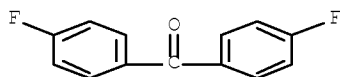
CMF C13 H10 O3



CM 2

CRN 345-92-6

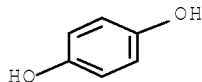
CMF C13 H8 F2 O



CM 3

CRN 123-31-9

CMF C6 H6 O2



IPCI C08J0005-22 [ICM,7]; C08J0005-20 [ICM,7,C*]

IPCR C08J0005-20 [I,A]; B01D0067-00 [I,C*]; B01D0067-00 [I,A];
 B01D0069-00 [I,C*]; B01D0069-12 [I,A]; B01D0071-00 [I,C*];
 B01D0071-52 [I,A]; B01D0071-68 [I,A]; B01D0071-80 [I,A]; B01D0071-82
 [I,A]; C08G0065-00 [I,C*]; C08G0065-40 [I,A]; C08J0005-20 [I,C*];
 C08J0005-22 [I,A]; H01B0001-06 [I,C*]; H01B0001-06 [I,A];
 H01M0008-02 [I,C*]; H01M0008-02 [I,A]; H01M0008-10 [I,C*];
 H01M0008-10 [I,A]

CC 38-3 (Plastics Fabrication and Uses)

Section cross-reference(s): 35, 76

ST sulfonated polymer ion conducting ~~membrane~~ prepn; fuel
 cell ~~membrane~~ polymer electrolyte ion conducting

IT ~~Membranes~~, nonbiological

(composite, microporous; preparation of ion conducting polymers for
 composite electrolyte ~~membrane~~)

IT Polyketones

(polyether-, aromatic, sulfonated, reaction products; preparation of ion
 conducting polymers for composite electrolyte ~~membrane~~)

IT Polysulfones, uses

(polyether-, sulfonated; preparation of ion conducting polymers for
 composite electrolyte ~~membrane~~)

IT Polyethers, uses

(polyketone-, aromatic, sulfonated, reaction products; preparation of ion

conducting polymers for composite electrolyte membrane)

IT Ionomers
(polyoxyalkylenes, fluorine- and sulfo-containing; in preparation of ion conducting polymers for composite electrolyte membrane)

IT Polyethers, uses
(polysulfone-, sulfonated; preparation of ion conducting polymers for composite electrolyte membrane)

IT Conducting polymers
Polymer electrolytes
(preparation of ion conducting polymers for composite electrolyte membrane)

IT Polymer blends
(preparation of ion conducting polymers for composite electrolyte membrane)

IT Fuel cells
(preparation of ion conducting polymers for composite electrolyte membrane in fuel cell)

IT 71957-60-3DP, 4,4'-Difluorobenzophenone-4,4'-
dihydroxybenzophenone-hydroquinone copolymer, sulfonated
83094-08-0DP, 4,4'-Dichlorodiphenylsulfone 4,4'-dihydroxybiphenyl
4,4'-dihydroxydiphenylsulfone copolymer, sulfonated 128324-23-2DP,
4,4'-Difluorobenzophenone-4,4'-dihydroxybenzophenone-4,4'-
dihydroxybiphenyl copolymer, sulfonated 128324-24-3DP,
4,4'-Difluorobenzophenone-4,4'-dihydroxybiphenyl-4,4'-
dihydroxydiphenylsulfone copolymer, sulfonated
(preparation of ion conducting polymers for composite electrolyte membrane)

IT 27380-27-4
(preparation of ion conducting polymers for composite electrolyte membrane)

RETABLE

Referenced	Referenced Author	Year	VOL	PG	Referenced Work	
	(RAU)	(RPY)	(RVL)	(RPG)	(RWK)	File
=====	=====	=====	=====	=====	=====	=====
==						
Anon					WO 0015691 A1	HCA
Anon					WO 0119896 A1	HCA
Anon					EP 0574791 A2	HCA
Anon					WO 9850457 A1	HCA
Anon					WO 9851733 A1	HCA
OS.CITING REF COUNT:	8	THERE ARE 8 CAPLUS RECORDS THAT CITE THIS RECORD (9 CITINGS)				

L87 ANSWER 5 OF 5 HCA COPYRIGHT 2010 ACS on STN

ACCESSION NUMBER: 132:237553 HCA Full-text

TITLE: Polyoxyphenylene ion-exchange polymers

INVENTOR(S): Charnock, Peter; Kemmish, David John; Staniland, Philip Anthony; Wilson, Brian

PATENT ASSIGNEE(S): Victrex Manufacturing Ltd., UK

SOURCE: PCT Int. Appl., 64 pp.
CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 2

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
-----	----	-----	-----	

WO 2000015691	A1	20000323	WO 1999-GB2833	199909 10
W: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW RW: GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
CA 2343184	A1	20000323	CA 1999-2343184	199909 10
CA 2343184	C	20100629		
AU 9957509	A	20000403	AU 1999-57509	199909 10
AU 764333	B2	20030814		
EP 1112301	A1	20010704	EP 1999-944684	199909 10
EP 1112301	B1	20060906		
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, CY				
JP 2002524631	T	20020806	JP 2000-570225	199909 10
EP 1493770	A2	20050105	EP 2004-77086	199909 10
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, FI, CY				
AT 338785	T	20060915	AT 1999-944684	199909 10
CA 2382144	A1	20010322	CA 2000-2382144	200009 08
CA 2382144	C	20081202		
WO 2001019896	A1	20010322	WO 2000-GB3449	200009 08
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
AU 2000070250	A	20010417	AU 2000-70250	200009 08
AU 778365	B2	20041202		
EP 1228122	A1	20020807	EP 2000-958834	200009 08
EP 1228122	B1	20070228		

R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC,
PT, IE, SI, LT, LV, FI, RO, MK, CY, AL

JP 2003509554 T 20030311 JP 2001-523671

200009
08

AT 355319 T 20060315 AT 2000-958834

200009
08

US 6828353 B1 20041207 US 2001-787011

200103
12

US 20040242710 A1 20041202 US 2004-875198

200406
25

US 6969755 B2 20051129

PRIORITY APPLN. INFO.:

GB 1998-19706 A

199809
11

GB 1998-20940 A

199809
28

GB 1999-13572 A

199906
11

EP 1999-944684 A3

199909
10

WO 1999-GB2833 W

199909
10

GB 2000-6884 A

200003
22

WO 2000-GB3449 W

200009
08

US 2001-787011 A1

200103
12

ASSIGNMENT HISTORY FOR US PATENT AVAILABLE IN LSUS DISPLAY FORMAT

AB Ion-Exchange polymers for a polymer electrolyte ~~membranes~~ include the repeating units EAr(C6H4)mE' (I), C6H4CO(C6H4)wG[(C6H4)rCOC6H4]s (II), and/or C6H4SO2(C6H4)zG[(C6H4)tSO2C6H4]v (III) wherein at least some of the units I, II and/or III are sulfonated; wherein the Ph moieties in units I, II, and III are independently optionally substituted and optionally cross-linked; and wherein m, r, s, t, v, w and z independently represent zero or a pos. integer, E and E' independently represent an oxygen or a sulfur atom or a direct link, G represents an oxygen or sulfur atom, a direct link or a -O-Ph-O- moiety where Ph represents a Ph group and Ar is selected from one of the above moieties (i) to (x) which is bonded via one or more of its Ph moieties to adjacent moieties.

IT 104570-14-IDP, sulfonated

(polyoxyphenylene ion-exchange polymers)

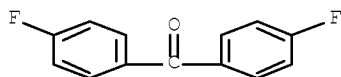
RN 104570-14-1 HCA

CN Methanone, bis(4-fluorophenyl)-, polymer with 1,4-benzenediol and
[1,1'-biphenyl]-4,4'-diol (CA INDEX NAME)

CM 1

CRN 345-92-6

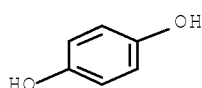
CMF C13 H8 F2 O



CM 2

CRN 123-31-9

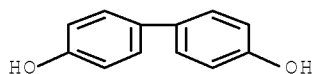
CMF C6 H6 O2



CM 3

CRN 92-88-6

CMF C12 H10 O2



IPCI C08G0065-48 [ICM,7]; C08G0065-00 [ICM,7,C*]; C08J0005-22 [ICS,7];
C08J0005-20 [ICS,7,C*]; H01M0006-18 [ICS,7]; H01M0010-40 [ICS,7];
H01M0010-36 [ICS,7,C*]; H01M0008-10 [ICS,7]; H01M0002-16 [ICS,7]

IPCR B01D0053-22 [I,C*]; B01D0053-22 [I,A]; B01D0071-00 [I,C*];
B01D0071-66 [I,A]; C08G0065-00 [I,C*]; C08G0065-38 [I,A];
C08G0065-48 [I,A]; C08G0075-00 [I,C*]; C08G0075-20 [I,A];
C08G0075-23 [I,A]; C08J0005-20 [I,C*]; C08J0005-22 [I,A];
H01M0008-02 [I,C*]; H01M0008-02 [I,A]; H01M0008-10 [I,C*];
H01M0008-10 [I,A]

CC 35-5 (Chemistry of Synthetic High Polymers)

ST sulfonated polyoxyphenylene ion exchange electrolyte
membrane

IT Membranes, nonbiological

(electrolyte; polyoxyphenylene ion-exchange polymers)

IT Electrodes

(gas-diffusion; polyoxyphenylene ion-exchange polymers)

IT Electrolytes

(membrane; polyoxyphenylene ion-exchange polymers)

IT 25718-32-5DP, sulfonated 83094-08-0DP, sulfonated 88033-16-3DP,
 sulfonated 104570-14-1DP, sulfonated
 105777-36-4DP, sulfonated 116875-10-6P 125430-17-3DP, sulfonated
 125431-57-4DP, sulfonated 128324-23-2DP,
 4,4'-Difluorobenzophenone-4,4'-dihydroxybenzophenone-4,4'-
 dihydroxybiphenyl copolymer, sulfonated 128324-24-3DP,
 4,4'-Difluorobenzophenone-4,4'-dihydroxybiphenyl-4,4'-
 dihydroxydiphenylsulfone copolymer, sulfonated 139357-70-3DP,
 sulfonated 261638-66-8P 261638-67-9DP, sulfonated
 (polyoxyphenylene ion-exchange polymers)

RETABLE

Referenced Author | Year | VOL | PG | Referenced Work |

Referenced

(RAU) | (RPY) | (RVL) | (RPG) | (RWK) | File

=====+=====+=====+=====+=====+=====+=====

==

Commissariat Energie At | 1997 | | | FR 2748485 A | HCA

Hoechst Ag | 1993 | | | EP 0574791 A | HCA

Ici Plc | 1980 | | | EP 0008895 A | HCA

Ici Plc | 1990 | | | EP 0382440 A | HCA

Joachim, C | 1996 | | | WO 9629360 A | HCA

Sumitomo Chemical Co | 1999 | | | EP 0932213 A | HCA

Union Carbide Corp | 1987 | | | EP 0211693 A | HCA

OS.CITING REF COUNT: 20 THERE ARE 20 CAPLUS RECORDS THAT CITE THIS
 RECORD (20 CITINGS)

----- (CARBONYL OR SULPHONE MOIETIES--CLAIM 3) -----

=> D L102 1-15 IBIB ABS HITSTR HITIND RETABLE

L102 ANSWER 1 OF 15 HCA COPYRIGHT 2010 ACS on STN

ACCESSION NUMBER: 144:394674 HCA Full-text

TITLE: Fuel cell apparatus and
 method of manufacture thereof

INVENTOR(S): Jeon, Yoocham

PATENT ASSIGNEE(S): Hewlett-Packard Development Company, L.P., USA

SOURCE: U.S. Pat. Appl. Publ., 36 pp.

CODEN: USXXCO

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 2

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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US 20060083852	A1	20060420	US 2004-968724	200410 18
			<--	
WO 2006044845	A1	20060427	WO 2005-US37345	200510 18
			<--	

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA,
 CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,
 GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM,

KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK,
 MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO,
 RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ,
 UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW
 RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU,
 IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR,
 BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD,
 TG, BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,
 ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM
 JP 2008517443 T 20080522 JP 2007-537955
 200510
 18
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 US 20060088747 A1 20060427 US 2005-297910
 200512
 09
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 PRIORITY APPLN. INFO.: US 2004-968724 A
 200410
 18
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 WO 2005-US37345 W
 200510
 18

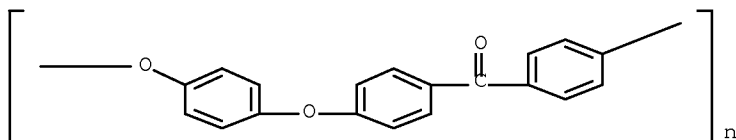
ASSIGNMENT HISTORY FOR US PATENT AVAILABLE IN LSUS DISPLAY FORMAT

AB Metal-coated polymer electrolyte ~~membranes~~ permeable to protons/hydrogen and methods of manufacturing thereof are disclosed. A ~~fuel cell~~ may be produced using a substrate, with the resultant design having a thin metal layer, such as palladium, positioned between two layers of a porous metal, such as palladium black, and optionally at least one layer of a polymer electrolyte. An alternate design uses at least one layer of a porous metal, such as palladium black, and optionally one or more layers of platinum black, in combination with a mold, sacrificial layer, and optional microstructure.

IT 31694-16-3D, PEEK, sulfonated
 (fuel cell apparatus and method of manufacture thereof)

RN 31694-16-3 HCA

CN Poly(oxy-1,4-phenyleneoxy-1,4-phenylenecarbonyl-1,4-phenylene) (CA INDEX NAME)



INCL 427115000; 429034000; 429030000; 429033000; 429040000
 IPCI B05D0005-12 [I,A]; H01M0008-10 [I,A]; H01M0008-02 [I,A]; H01M0004-92 [I,A]; H01M0004-90 [I,C*]
 IPCR B05D0005-12 [I,A]; B05D0005-12 [I,C]; H01M0004-90 [I,C]; H01M0004-92 [I,A]; H01M0008-02 [I,C]; H01M0008-02 [I,A]; H01M0008-10 [I,C]; H01M0008-10 [I,A]
 NCL 427/115.000; 429/494.000; 429/524.000; 429/534.000
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 Section cross-reference(s): 38
 ST polymer electrolyte ~~membrane~~ fuel cell fabrication

IT Fuel cell electrolytes
(fuel cell apparatus and method of manufacture thereof)

IT Coating materials
(palladium black; fuel cell apparatus and method
of manufacture thereof)

IT Sulfonic acids
(perfluorosulfonic acid polymers; fuel cell
apparatus and method of manufacture thereof)

IT Coating materials
(platinum black; fuel cell apparatus and method of
manufacture thereof)

IT Polyketones
(polyether-, sulfonated; fuel cell apparatus and
method of manufacture thereof)

IT Polyethers
(polyketone-, sulfonated; fuel cell apparatus and
method of manufacture thereof)

IT Fuel cells
(polymer electrolyte; fuel cell apparatus and
method of manufacture thereof)

IT Fluoropolymers
(sulfo-containing, perfluoro; fuel cell apparatus and
method of manufacture thereof)

IT 12779-05-4
(black; fuel cell apparatus and method of manufacture
thereof)

IT 31694-16-3D, PEEK, sulfonated
(fuel cell apparatus and method of manufacture thereof)

IT 7440-05-3, Palladium, uses
(fuel cell apparatus and method of manufacture thereof)

OS.CITING REF COUNT: 1 THERE ARE 1 CAPLUS RECORDS THAT CITE THIS
RECORD (1 CITINGS)

L102 ANSWER 2 OF 15 HCA COPYRIGHT 2010 ACS on STN

ACCESSION NUMBER: 144:111204 HCA Full-text

TITLE: Synthesis of nanostructured materials for
biosensor and fuel cell
applications

AUTHOR(S): Gil, Maria Paula

CORPORATE SOURCE: Tulane Univ., New Orleans, LA, USA

SOURCE: (2004) 125 pp. Avail.: UMI, Order No.
DA3170324
From: Diss. Abstr. Int., B 2005, 66(3), 1585

DOCUMENT TYPE: Dissertation

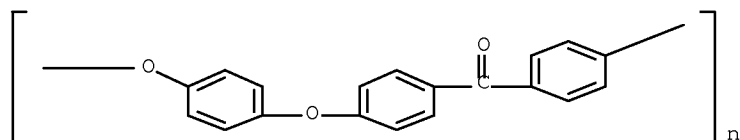
LANGUAGE: English

AB Unavailable

IT 31694-16-3
(sulfonated, membranes; nanostructured
materials for platinum nanowire-based glucose biosensors sensors
and sulfonated PEEK membranes for
fuel cells)

RN 31694-16-3 HCA

CN Poly(oxy-1,4-phenyleneoxy-1,4-phenylenecarbonyl-1,4-phenylene) (CA
INDEX NAME)



- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 9
- ST nanostructure platinum nanowire glucose sensor; fuel
cell separators sulfonated PEEK membrane
nanostructure
- IT Biosensors
(enzymic, for glucose; nanostructured materials for platinum
nanowire-based glucose biosensors sensors and sulfonated PEEK
membranes for fuel cells)
- IT Fuel cell separators
Glucose sensors
(nanostructured materials for platinum nanowire-based glucose
biosensors sensors and sulfonated PEEK membranes for
fuel cells)
- IT Polyketones
(polyether-, sulfonated, membranes; nanostructured
materials for platinum nanowire-based glucose biosensors sensors
and sulfonated PEEK membranes for fuel
cells)
- IT Polyethers, uses
(polyketone-, sulfonated, membranes; nanostructured
materials for platinum nanowire-based glucose biosensors sensors
and sulfonated PEEK membranes for fuel
cells)
- IT 7440-06-4, Platinum, uses
(nanowires; nanostructured materials for platinum nanowire-based
glucose biosensors sensors and sulfonated PEEK membranes
for fuel cells)
- IT 50-99-7, D-Glucose, analysis
(sensors; nanostructured materials for platinum nanowire-based
glucose biosensors sensors and sulfonated PEEK membranes
for fuel cells)
- IT 31694-16-3
(sulfonated, membranes; nanostructured
materials for platinum nanowire-based glucose biosensors sensors
and sulfonated PEEK membranes for
fuel cells)

L102 ANSWER 3 OF 15 HCA COPYRIGHT 2010 ACS on STN

ACCESSION NUMBER: 143:250965 HCA Full-text

TITLE: Manufacture of proton-conductive
membrane with improved characteristics
by surface treatment for fuel
cell electrolyte

INVENTOR(S): Okada, Takashi; Kadota, Mayumi; Yoshii, Kimihiko

PATENT ASSIGNEE(S): JSR Ltd., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 19 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2005226047	A	20050825	JP 2004-38727	20040216

PRIORITY APPLN. INFO.:

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20040216

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20040216

AB The ~~membrane~~ is manufactured by forming a film containing acidic ion-conductive component-containing polymers and hydrophilizing or peeling the film. Preferably, the hydrophilizing or peeling step is carried out by bringing the film into contact with O₃ or irradiating UV to the film. The manufactured ~~membrane~~ with improved proton conductivity and adhesion to electrodes is also claimed.

IT 847356-67-6DP, sulfonated
(manufacture of proton-conductive ~~membrane~~ with improved characteristics by surface treatment for fuel cell electrolyte)

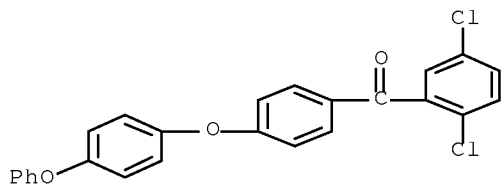
RN 847356-67-6 HCA

CN Methanone, bis(4-hydroxyphenyl)-, polymer with (2,5-dichlorophenyl)[4-(4-phenoxyphenoxy)phenyl]methanone and 1,1'-sulfonylbis[4-chlorobenzene], block (9CI) (CA INDEX NAME)

CM 1

CRN 463954-50-9

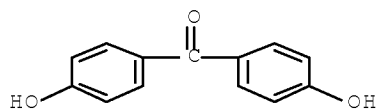
CMF C25 H16 C12 O3



CM 2

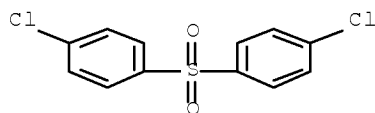
CRN 611-99-4

CMF C13 H10 O3



CM 3

CRN 80-07-9
CMF C12 H8 C12 O2 S



IPCI C08J0007-00 [ICM, 7]; C08G0065-40 [ICS, 7]; C08G0065-00 [ICS, 7, C*];
H01B0001-06 [ICS, 7]; H01B0013-00 [ICS, 7]; H01M0008-02 [ICS, 7];
H01M0008-10 [ICS, 7]; C08L0071-08 [ICS, 7]; C08L0071-00 [ICS, 7, C*]
IPCR C08G0065-00 [I, C*]; C08G0065-40 [I, A]; C08J0007-00 [I, A];
C08J0007-00 [I, C*]; H01B0001-06 [N, A]; H01B0001-06 [N, C*];
H01B0013-00 [N, A]; H01B0013-00 [N, C*]; H01M0008-02 [N, A];
H01M0008-02 [N, C*]; H01M0008-10 [N, A]; H01M0008-10 [N, C*]
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 76
ST proton conductive polymer membrane fuel
cell electrolyte; hydrophilization surface treatment proton
conductive polymer membrane manuf; peeling surface
treatment proton conductive polymer membrane manuf
IT Perfluoro compounds
(alkanesulfonic acids, polymers; manufacture of proton-conductive
membrane with improved characteristics by surface
treatment for fuel cell electrolyte)
IT Sulfonic acids, uses
(alkanesulfonic, perfluoro, polymers; manufacture of proton-conductive
membrane with improved characteristics by surface
treatment for fuel cell electrolyte)
IT Fuel cell electrolytes
Membranes, nonbiological
(manufacture of proton-conductive membrane with improved
characteristics by surface treatment for fuel
cell electrolyte)
IT Polysulfones, uses
(polyether-polyketone-, block, sulfonated; manufacture of
proton-conductive membrane with improved
characteristics by surface treatment for fuel
cell electrolyte)
IT Polyketones
(polyether-polysulfone-, block, sulfonated; manufacture of
proton-conductive membrane with improved
characteristics by surface treatment for fuel
cell electrolyte)
IT Polyethers, uses
(polyketone-polysulfone-, block, sulfonated; manufacture of
proton-conductive membrane with improved
characteristics by surface treatment for fuel
cell electrolyte)
IT Ionic conductors
(protonic; manufacture of proton-conductive membrane with
improved characteristics by surface treatment for fuel
cell electrolyte)
IT Ozonization
UV radiation
(surface treatment by; manufacture of proton-conductive

membrane with improved characteristics by surface treatment for fuel cell electrolyte)

IT 847356-67-6DP, sulfonated

(manufacture of proton-conductive membrane with improved characteristics by surface treatment for fuel cell electrolyte)

IT 66796-30-3, Nafion 117

(manufacture of proton-conductive membrane with improved characteristics by surface treatment for fuel cell electrolyte)

OS.CITING REF COUNT: 3 THERE ARE 3 CAPLUS RECORDS THAT CITE THIS RECORD (3 CITINGS)

L102 ANSWER 4 OF 15 HCA COPYRIGHT 2010 ACS on STN

ACCESSION NUMBER: 143:17776 HCA Full-text

TITLE: Acid-base composite-type polymer electrolyte membrane

INVENTOR(S): Yamakawa, Yoshitaka; Otsuki, Toshitaka

PATENT ASSIGNEE(S): JSR Ltd., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 33 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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JP 2005149949	A	20050609	JP 2003-386859	20031117
			<--	
JP 4512843	B2	20100728		
PRIORITY APPLN. INFO.:			JP 2003-386859	20031117
				<--

AB The membrane comprises sulfo-containing polyarylenes and polymers having functional groups (e.g., N-containing basic group) interactive to the sulfo groups. The membrane shows high proton conductivity in wire temperature region, good mech. properties, and low MeOH permeability and is suitable for fuel cells .

IT 463963-71-5DP, Bisphenol

AF-4,4'-dichlorobenzophenone-2,5-dichloro-4'-(4-phenoxy)phenoxybenzophenone copolymer, sulfonated

(acid-base composite-type polymer electrolyte membrane containing sulfo-containing polyarylenes and sulfo-interactive group-containing polymers)

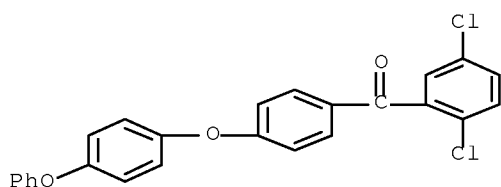
RN 463963-71-5 HCA

CN Methanone, bis(4-chlorophenyl)-, polymer with (2,5-dichlorophenyl)[4-(4-phenoxyphenoxy)phenyl]methanone and 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethyldiene]bis[phenol] (9CI) (CA INDEX NAME)

CM 1

CRN 463954-50-9

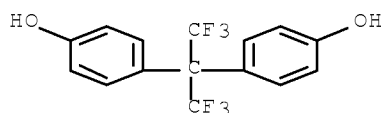
CMF C25 H16 Cl2 O3



CM 2

CRN 1478-61-1

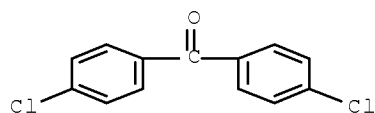
CMF C15 H10 F6 O2



CM 3

CRN 90-98-2

CMF C13 H8 Cl2 O



IPCI H01B0001-06 [I,A]; C08L0065-00 [I,A]; C08L0101-02 [I,A]; C08L0101-00 [I,C*]; H01M0008-02 [N,A]; H01M0008-10 [N,A]

IPCR C08L0065-00 [I,A]; C08L0065-00 [I,C*]; C08L0101-00 [I,C*]; C08L0101-02 [I,A]; H01B0001-06 [I,A]; H01B0001-06 [I,C*]; H01M0008-02 [N,A]; H01M0008-02 [N,C*]; H01M0008-10 [N,A]; H01M0008-10 [N,C*]

CC 76-2 (Electric Phenomena)

Section cross-reference(s): 38, 52

ST acid base composite polymer electrolyte ~~membrane~~;
fuel cell sulfo polyarylene basic polymer
electrolyte ~~membrane~~

IT Fuel cell electrolytes

Polymer electrolytes

(acid-base composite-type polymer electrolyte ~~membrane~~
containing sulfo-containing polyarylenes and sulfo-interactive
group-containing polymers)

IT Polyketones

(polyether-, fluorine-containing; acid-base composite-type polymer
electrolyte ~~membrane~~ containing sulfo-containing polyarylenes
and sulfo-interactive group-containing polymers)

IT Fluoropolymers, uses

(polyether-polyketone-; acid-base composite-type polymer electrolyte ~~membrane~~ containing sulfo-containing polyarylenes and sulfo-interactive group-containing polymers)

IT Polyethers, uses
(polyketone-, fluorine-containing; acid-base composite-type polymer electrolyte ~~membrane~~ containing sulfo-containing polyarylenes and sulfo-interactive group-containing polymers)

IT Ionic conductors
(protonic; acid-base composite-type polymer electrolyte ~~membrane~~ containing sulfo-containing polyarylenes and sulfo-interactive group-containing polymers)

IT 463963-71-3DP, Bisphenol AF-4,4'-dichlorobenzophenone-2,5-dichloro-4'-(4-phenoxy)phenoxybenzophenone copolymer, ~~sulfonated~~ 663920-28-3DP, Bisphenol AF-4,4'-dichlorobenzophenone-neopentyl 4-[4-(2,5-dichlorobenzoyl)phenoxy]benzenesulfonate copolymer, hydrolyzed
(acid-base composite-type polymer electrolyte ~~membrane~~ containing sulfo-containing polyarylenes and sulfo-interactive group-containing polymers)

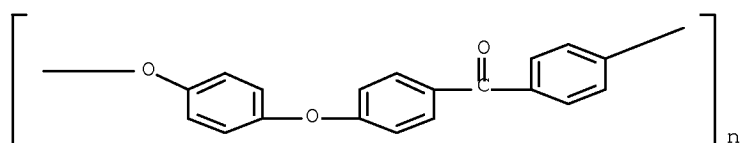
IT 9003-39-8, Poly(vinyl pyrrolidone)
(acid-base composite-type polymer electrolyte ~~membrane~~ containing sulfo-containing polyarylenes and sulfo-interactive group-containing polymers)

L102 ANSWER 5 OF 15 HCA COPYRIGHT 2010 ACS on STN
ACCESSION NUMBER: 142:177887 HCA Full-text
TITLE: Polymer sulfonation - a versatile route to preparing proton-conducting ~~membrane~~ material for advanced technologies
AUTHOR(S): Zaidi, S. M. Javaid
CORPORATE SOURCE: Chemical Engineering Department, King Fahd University of Petroleum & Minerals, Dhahran, Saudi Arabia
SOURCE: Arabian Journal for Science and Engineering, Section B: Engineering (2003), 28(2B), 183-194
CODEN: AJSEF2; ISSN: 1319-8025
PUBLISHER: King Fahd University of Petroleum and Minerals
DOCUMENT TYPE: Journal
LANGUAGE: English

AB Sulfonation of polymers is a viable method for making proton exchange ~~membranes~~ used in electrochem. devices. Polyether-ether ketone was modified by using concentrated H2SO4 (97.4%) to produce ion-containing polymers bearing HSO3 groups. The sulfonated polymer was characterized for IEC, 1HNMR, DSC, and H2O uptake etc. The degree of sulfonation of sulfonated PEEK was found to vary 40-80 mol%. The PEEK became amorphous after sulfonation (DSC and WXR), which enhanced its solubility in organic solvents such as DMF. The glass transition temperature, Tg increased from 151° for pure PEEK to 217° upon sulfonation. The H2O uptake was also increased with sulfonation level, which provides formation of water-mediated pathways for protons involving SO3H groups. The ~~membranes~~ from these polymers have a high potential for use in electrochem. devices such as polymer fuel cell and electrodialysis.

IT 31694-16-3DP, ~~sulfonated~~
(~~sulfonated~~ PEEK as proton-conducting ~~membrane~~ material)

RN 31694-16-3 HCA
CN Poly(oxy-1,4-phenyleneoxy-1,4-phenylenecarbonyl-1,4-phenylene) (CA INDEX NAME)



CC 38-3 (Plastics Fabrication and Uses)
 Section cross-reference(s): 37

ST polyether polyketone sulfonated proton exchange membrane;
 fuel cell separator polyether polyketone
 sulfonated

IT Polyketones
 (polyether-, sulfonated, aromatic; sulfonated PEEK as
 proton-conducting membrane material)

IT Polyethers, uses
 (polyketone-, sulfonated, aromatic; sulfonated PEEK as
 proton-conducting membrane material)

IT Sulfonation
 (property modification by; sulfonated PEEK as proton-conducting
 membrane material)

IT Fuel cells
 (proton exchange membrane; sulfonated PEEK as
 proton-conducting membrane material)

IT Ionic conductors
 (protonic; sulfonated PEEK as proton-conducting membrane
 material)

IT Crystallinity
 Fuel cell separators
 Glass transition temperature
 Solubility
 (sulfonated PEEK as proton-conducting membrane
 material)

IT 31694-16-3DP, sulfonated
 (sulfonated PEEK as proton-conducting membrane
 material)

RETABLE

Referenced Author	Year	VOL	PG	Referenced Work	
Referenced					
(RAU)	(RPY)	(RVL)	(RPG)	(RWK)	File

=====+=====+=====+=====+=====+=====

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October 25, 2010

10/551,576

38

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 Savadogo, O |1998 |1 |66 |J New Mat Electroche|
 Shoesmith, J |1994 |49 |129 |J Power Source |HCA
 Sivashinsky, N |1983 |28 |3235 |J Appl Polym Sci |HCA
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 Zaidi, S |2000 |173 |17 |J Membrane Science |HCA
 Zaidi, S |2000 | | |PhD Thesis, Laval Un|
 OS.CITING REF COUNT: 7 THERE ARE 7 CAPLUS RECORDS THAT CITE THIS
 RECORD (7 CITINGS)

L102 ANSWER 6 OF 15 HCA COPYRIGHT 2010 ACS on STN
 ACCESSION NUMBER: 141:280351 HCA Full-text
 TITLE: Polymer electrolyte material, polymer
 electrolyte parts, ~~membrane-~~
~~electrode~~ laminate, and polymer
 electrolyte fuel cell
 INVENTOR(S): Adachi, Shinya; Izuhara, Daisuke; Nakamura,
 Masataka; Ito, Nobuaki
 PATENT ASSIGNEE(S): Toray Industries, Inc., Japan
 SOURCE: PCT Int. Appl., 147 pp.
 CODEN: PIXXD2
 DOCUMENT TYPE: Patent
 LANGUAGE: Japanese
 FAMILY ACC. NUM. COUNT: 1
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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WO 2004079844	A1	20040916	WO 2004-JP2894	200403 05
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JP 2004269599	A	20040930	JP 2003-59569	200303 06
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CA 2518414	A1	20040916	CA 2004-2518414	200403 05
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EP 1619735	A1	20060125	EP 2004-717850	200403 05
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US 20060180796	A1	20060817	US 2005-548110	20050906
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PRIORITY APPLN. INFO.:			JP 2003-59569	A 20030306
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			JP 2003-116685	A 20030422
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			JP 2003-120115	A 20030424
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			JP 2003-386734	A 20031117
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			JP 2003-386735	A 20031117
			<--	
			WO 2004-JP2894	W 20040305

ASSIGNMENT HISTORY FOR US PATENT AVAILABLE IN LSUS DISPLAY FORMAT

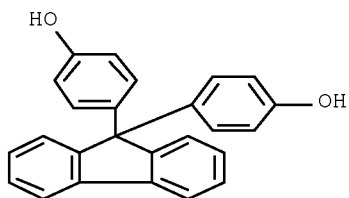
AB The electrolyte material has a nonfreezing water fraction (Rw1) of 20-100 in a hydrous state {Rw1 = [Wnf/(Wfc + Wnf)]}; Wnf= amount of nonfreezing water per g of dry weight of polymer electrolyte material; and Wfc= amount of low m.p. water per g of dry weight of polymer electrolyte material}. The parts, the laminate, and the fuel cell use the above material. The fuel cell, using the above material, has excellent proton-conductivity and fuel cutoff properties and improved efficiency.

IT 116875-10-6D, sulfonated 116875-11-7D, sulfonated 125658-29-9D, sulfonated 132109-45-6D, sulfonated 132139-83-4D, sulfonated 136691-69-5D, sulfonated 146027-07-8D, sulfonated 146088-68-8D, sulfonated 199610-91-8D, sulfonated 758706-30-8D, sulfonated 758706-31-9D, sulfonated 758706-34-2D, sulfonated 758706-35-3D, sulfonated
(fuel cells containing polymer electrolyte materials with controlled nonfreezing water fraction for improved efficiency)

RN 116875-10-6 HCA

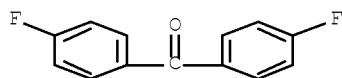
CN Methanone, bis(4-fluorophenyl)-, polymer with 1,4-benzenediol and 4,4'-(9H-fluoren-9-ylidene)bis[phenol] (9CI) (CA INDEX NAME)

CRN 3236-71-3
CMF C25 H18 O2



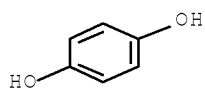
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CRN 345-92-6
CMF C13 H8 F2 O



CM 3

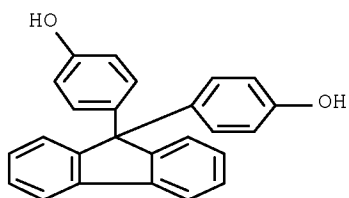
CRN 123-31-9
CMF C6 H6 O2



RN 116875-11-7 HCA
CN 1,4-Benzenediol, polymer with 4,4'-(9H-fluoren-9-ylidene)bis[phenol]
and 1,1'-sulfonylbis[4-fluorobenzene] (9CI) (CA INDEX NAME)

CM 1

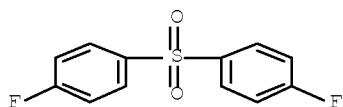
CRN 3236-71-3
CMF C25 H18 O2



CM 2

CRN 383-29-9

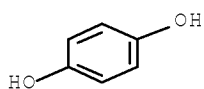
CMF C12 H8 F2 O2 S



CM 3

CRN 123-31-9

CMF C6 H6 O2



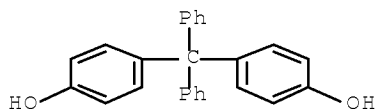
RN 125658-29-9 HCA

CN Methanone, bis(4-fluorophenyl)-, polymer with 1,4-benzenediol and 4,4'-(diphenylmethylene)bis[phenol] (9CI) (CA INDEX NAME)

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CRN 1844-01-5

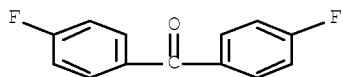
CMF C25 H20 O2



CM 2

CRN 345-92-6

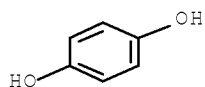
CMF C13 H8 F2 O



CM 3

CRN 123-31-9

CMF C6 H6 O2



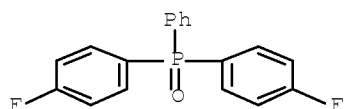
RN 132109-45-6 HCA

CN 1,4-Benzenediol, polymer with bis(4-fluorophenyl)phenylphosphine oxide (9CI) (CA INDEX NAME)

CM 1

CRN 54300-32-2

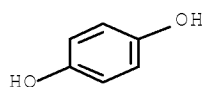
CMF C18 H13 F2 O P



CM 2

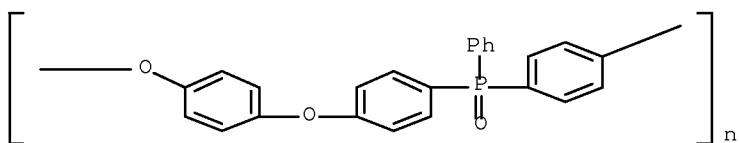
CRN 123-31-9

CMF C6 H6 O2



RN 132139-83-4 HCA

CN Poly[oxy-1,4-phenyleneoxy-1,4-phenylene(phenylphosphinyldiene)-1,4-phenylene] (9CI) (CA INDEX NAME)



RN 136691-69-5 HCA

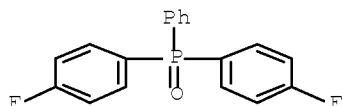
CN Methanone, bis(4-fluorophenyl)-, polymer with 1,4-benzenediol and

bis(4-fluorophenyl)phenylphosphine oxide (9CI) (CA INDEX NAME)

CM 1

CRN 54300-32-2

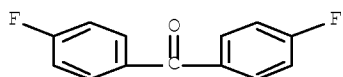
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CM 2

CRN 345-92-6

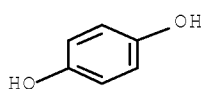
CMF C13 H8 F2 O



CM 3

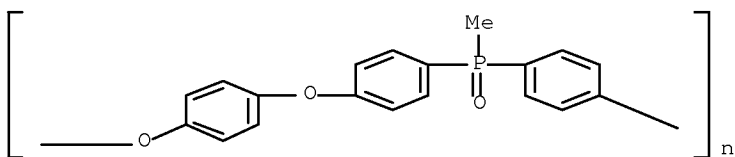
CRN 123-31-9

CMF C6 H6 O2



RN 146027-07-8 HCA

CN Poly[oxy-1,4-phenyleneoxy-1,4-phenylene(methylphosphinyldene)-1,4-phenylene] (9CI) (CA INDEX NAME)

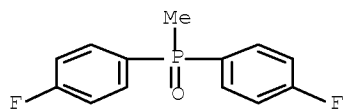


RN 146088-68-8 HCA

CN 1,4-Benzenediol, polymer with bis(4-fluorophenyl)methylphosphine oxide (9CI) (CA INDEX NAME)

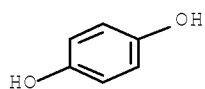
CM 1

CRN 25186-24-7
CMF C13 H11 F2 O P



CM 2

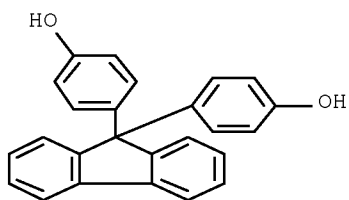
CRN 123-31-9
CMF C6 H6 O2



RN 199610-91-8 HCA
CN Methanone, bis(4-fluorophenyl)-, polymer with 1,3-benzenediol and
4,4'-(9H-fluoren-9-ylidene)bis[phenol] (CA INDEX NAME)

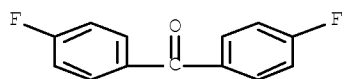
CM 1

CRN 3236-71-3
CMF C25 H18 O2



CM 2

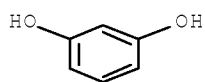
CRN 345-92-6
CMF C13 H8 F2 O



CM 3

CRN 108-46-3

CMF C6 H6 O2



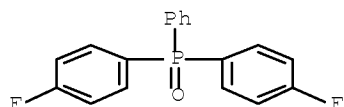
RN 758706-30-8 HCA

CN 1,4-Benzenediol, polymer with bis(4-fluorophenyl)phenylphosphine oxide and 1,1'-sulfonylbis[4-fluorobenzene] (9CI) (CA INDEX NAME)

CM 1

CRN 54300-32-2

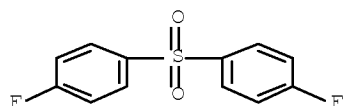
CMF C18 H13 F2 O P



CM 2

CRN 383-29-9

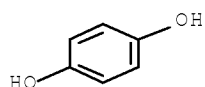
CMF C12 H8 F2 O2 S



CM 3

CRN 123-31-9

CMF C6 H6 O2



RN 758706-31-9 HCA

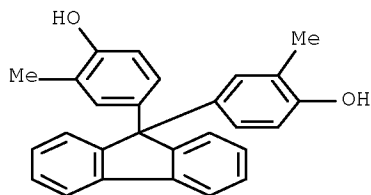
CN Methanone, bis(4-fluorophenyl)-, polymer with 1,4-benzenediol and 4,4'-(9H-fluoren-9-ylidene)bis[2-methylphenol] (9CI) (CA INDEX NAME)

NAME)

CM 1

CRN 88938-12-9

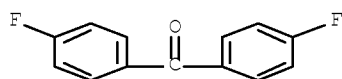
CMF C27 H22 O2



CM 2

CRN 345-92-6

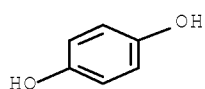
CMF C13 H8 F2 O



CM 3

CRN 123-31-9

CMF C6 H6 O2



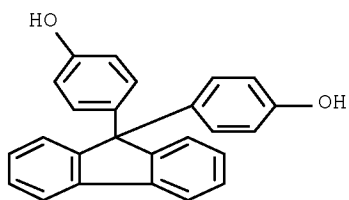
RN 758706-34-2 HCA

CN Methanone, bis(4-fluorophenyl)-, polymer with
[1,1'-biphenyl]-2,5-diol and 4,4'-(9H-fluoren-9-ylidene)bis[phenol]
(9CI) (CA INDEX NAME)

CM 1

CRN 3236-71-3

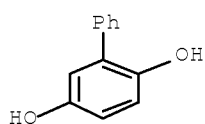
CMF C25 H18 O2



CM 2

CRN 1079-21-6

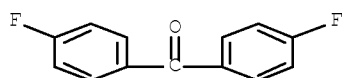
CMF C12 H10 O2



CM 3

CRN 345-92-6

CMF C13 H8 F2 O



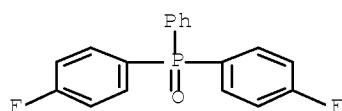
RN 758706-35-3 HCA

CN 1,4-Benzenediol, polymer with bis(4-fluorophenyl)phenylphosphine oxide and 4,4'-(9H-fluoren-9-ylidene)bis[phenol] (9CI) (CA INDEX NAME)

CM 1

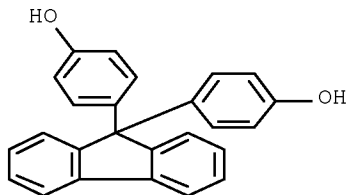
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CMF C18 H13 F2 O P



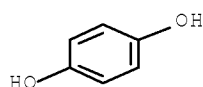
CM 2

CRN 3236-71-3
CMF C25 H18 O2



CM 3

CRN 123-31-9
CMF C6 H6 O2



IPCI H01M0008-02 [ICM,7]; C08G0079-04 [ICS,7]; C08G0079-00 [ICS,7,C*];
C08G0075-02 [ICS,7]; C08G0075-20 [ICS,7]; C08G0075-00 [ICS,7,C*];
C08G0065-40 [ICS,7]; C08G0065-00 [ICS,7,C*]; H01B0001-06 [ICS,7]
IPCR C08G0065-00 [I,C*]; C08G0065-40 [I,A]; C08G0075-00 [I,C*];
C08G0075-02 [I,A]; C08G0075-20 [I,A]; C08G0079-00 [I,C*];
C08G0079-04 [I,A]; C09K0005-00 [I,C*]; C09K0005-20 [I,A];
H01B0001-06 [I,C*]; H01B0001-06 [I,A]; H01B0001-12 [I,C*];
H01B0001-12 [I,A]; H01M0004-86 [N,C*]; H01M0004-86 [N,A];
H01M0004-88 [I,C*]; H01M0004-88 [I,A]; H01M0004-90 [N,C*];
H01M0004-92 [N,A]; H01M0008-02 [I,C*]; H01M0008-02 [I,A];
H01M0008-04 [I,C*]; H01M0008-04 [I,A]; H01M0008-10 [I,C*];
H01M0008-10 [I,A]
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST **fuel cell** polymer electrolyte material
nonfreezing water fraction control
IT Polyoxyalkylenes, uses
(fluorine- and sulfo-containing, ionomers; **fuel**
cells containing polymer electrolyte materials with
controlled nonfreezing water fraction for improved efficiency)
IT **Fuel cell** electrolytes
Fuel cells
(**fuel cells** containing polymer electrolyte
materials with controlled nonfreezing water fraction for improved
efficiency)
IT Carbon fibers, uses
Fluoropolymers, uses
(**fuel cells** containing polymer electrolyte
materials with controlled nonfreezing water fraction for improved
efficiency)
IT Fluoropolymers, uses
(polyoxyalkylene-, sulfo-containing, ionomers; **fuel**
cells containing polymer electrolyte materials with

controlled nonfreezing water fraction for improved efficiency)

IT Ionomers
(polyoxyalkylenes, fluorine- and sulfo-containing; fuel
cells containing polymer electrolyte materials with
controlled nonfreezing water fraction for improved efficiency)

IT 7440-44-0, Carbon, uses 9002-84-0, PTFE 12779-05-4
65978-77-0D, sulfonated 106444-61-5D, sulfonated 108809-07-0D,
sulfonated 116875-10-6D, sulfonated
116875-11-7D, sulfonated 122159-35-7D,
sulfonated 123349-32-6D, sulfonated 125658-29-9D,
sulfonated 132109-45-6D, sulfonated
132139-83-4D, sulfonated 136691-69-5D,
sulfonated 146027-07-8D, sulfonated
146088-68-8D, sulfonated 199610-91-8D,
sulfonated 349672-97-5D, sulfonated 673477-33-3D,
sulfonated 758706-29-5D, sulfonated 758706-30-8D,
sulfonated 758706-31-9D, sulfonated
758706-32-0D, sulfonated 758706-33-1D, sulfonated
758706-34-2D, sulfonated 758706-35-3D,
sulfonated
(fuel cells containing polymer electrolyte
materials with controlled nonfreezing water fraction for improved
efficiency)

RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	File
Dainippon Ink And Chemi	1993			JP 05-271460 A	HCA
Hatanaka, T	2002	37	59	R & D Review of Toyo	HCA
Nitto Denko Corp	2001			JP 2001294705 A	HCA
Nitto Denko Corp	2001			JP 2001294706 A	HCA
Sumitomo Chemical Co Lt	1981			JP 56-34329 B2	HCA
Toa Nenryo Kogyo Kabush	1989			JP 64-22932 A	
Tonen Corp	1996			JP 08-180891 A	HCA
Toyota Central Research	1998			JP 10-340732 A	HCA
Toyota Central Research	2002			JP 2002324559 A	HCA
University Of Southern	2001			WO 2001504636 A	
University Of Southern	2001			US 6444343 B1	HCA
University Of Southern	2001			WO 9822989 A1	HCA
Victrex Manufacturing L	2002			WO 0015691 A1	HCA
Victrex Manufacturing L	2002			WO 0119896 A1	HCA
Victrex Manufacturing L	2002			JP 2002524631 A	
Walker, M	1999	74	67	Journal of Applied P	HCA

OS.CITING REF COUNT: 3 THERE ARE 3 CAPLUS RECORDS THAT CITE THIS
RECORD (5 CITINGS)

L102 ANSWER 7 OF 15 HCA COPYRIGHT 2010 ACS on STN
ACCESSION NUMBER: 140:409513 HCA Full-text
TITLE: Synthesis and characterization of highly
sulfonated polyarylenethioethersulfones for
fuel cell applications
AUTHOR(S): Dang, Thuy D.; Bai, Zongwu; Dalton, Matthew J.;
Fossum, Eric
CORPORATE SOURCE: AFRL/MLBP, Materials and Manufacturing
Directorate, Wright-Patterson Air Force Base,
OH, 45433, USA
SOURCE: Polymer Preprints (American Chemical Society,
Division of Polymer Chemistry) (2004),

45(1), 22-23

CODEN: ACPPAY; ISSN: 0032-3934

PUBLISHER:

American Chemical Society, Division of Polymer Chemistry

DOCUMENT TYPE:

Journal; (computer optical disk)

LANGUAGE:

English

AB The development of new polymer electrolyte membranes has been necessitated by the fact that com. Nafion membranes do not meet the requirements for high temperature (>120 °C) fuel cell operation. In this paper, the synthesis and characterization of highly sulfonated polyarylenethioethersulfone are described. The polymer backbone is wholly aromatic, bulky aromatic end-caps, and there is high sulfuric acid content to enhance water retention and potential applicability for high temperature (>120 °C) fuel cells applications. Proton conductivities, solubilities in water and various solvents, mol. weight, intrinsic viscosity, and film properties were measured of polymers in the salt and also acid form, both uncapped and capped. The proton conductivity of polymers is at least three times higher than that of the state-of-the-art Nafion-H proton exchange membrane under nearly comparable conditions, indicating that these polymers are promising candidates for PEMs in fuel cells.

IT 689262-96-2DP, endcapped with phenyl-based monohalides
689263-01-2DP, reaction products with phenyl-based monohalides

(acid form; synthesis and characterization of highly sulfonated polyarylenethioethersulfones for fuel cell applications)

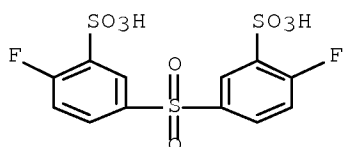
RN 689262-96-2 HCA

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-fluoro-, sodium salt (1:2), polymer with 4,4'-thiobis[benzenethiol] (CA INDEX NAME)

CM 1

CRN 301155-59-9

CMF C12 H8 F2 O8 S3 . 2 Na

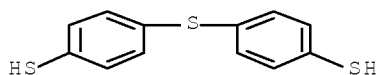


●2 Na

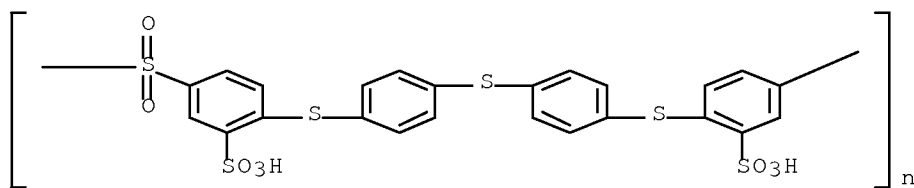
CM 2

CRN 19362-77-7

CMF C12 H10 S3



RN 689263-01-2 HCA
 CN Poly[sulfonyl(3-sulfo-1,4-phenylene)thio-1,4-phenylenethio-1,4-phenylenethio(2-sulfo-1,4-phenylene) sodium salt (1:2)] (CA INDEX NAME)



●2 Na

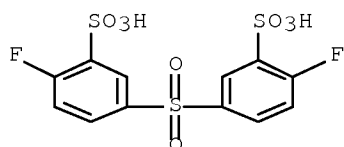
IT 689262-96-2P 689262-99-5DP, reaction products with phenyl-based monohalides 689263-01-2P (synthesis and characterization of highly sulfonated polyarylenethioethersulfones for fuel cell applications)

RN 689262-96-2 HCA
 CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-fluoro-, sodium salt (1:2), polymer with 4,4'-thiobis[benzenethiol] (CA INDEX NAME)

CM 1

CRN 301155-59-9

CMF C12 H8 F2 O8 S3 . 2 Na

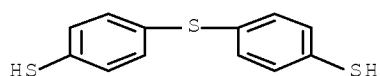


●2 Na

CM 2

CRN 19362-77-7

CMF C12 H10 S3



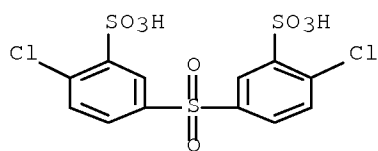
RN 689262-99-5 HCA

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, sodium salt (1:2),
polymer with 4,4'-thiobis[benzenethiol] (CA INDEX NAME)

CM 1

CRN 51698-33-0

CMF C12 H8 Cl2 O8 S3 . 2 Na

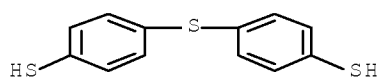


●2 Na

CM 2

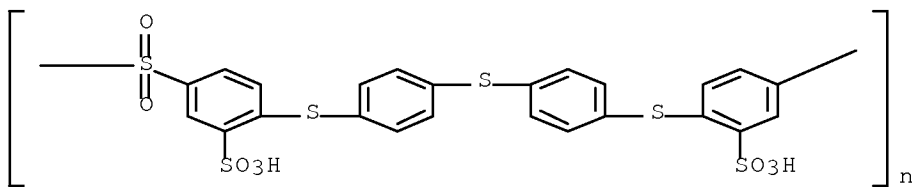
CRN 19362-77-7

CMF C12 H10 S3



RN 689263-01-2 HCA

CN Poly[sulfonyl(3-sulfo-1,4-phenylene)thio-1,4-phenylenethio-1,4-phenylenethio(2-sulfo-1,4-phenylene) sodium salt (1:2)] (CA INDEX NAME)

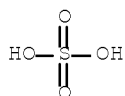


●2 Na

IT 7664-93-9, Sulfuric acid, reactions
(synthesis and characterization of highly sulfonated
polyarylenethioethersulfones for fuel cell
applications)

RN 7664-93-9 HCA

CN Sulfuric acid (CA INDEX NAME)



- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 35, 38, 76
- ST sulfonated poly aryleneethioether sulfone fuel cell
separator proton cond
- IT ~~Membranes~~, nonbiological
(elec. conductive; synthesis and characterization of highly
sulfonated polyarylenethioethersulfones for fuel
cell applications)
- IT Fuel cell separators
(new materials for; synthesis and characterization of highly
sulfonated polyarylenethioethersulfones for fuel
cell applications)
- IT Polysulfones, preparation
(polyarylene-polyether-; synthesis and characterization of highly
sulfonated polyarylenethioethersulfones for fuel
cell applications)
- IT Polyethers, preparation
(polyarylene-polysulfone-; synthesis and characterization of
highly sulfonated polyarylenethioethersulfones for fuel
cell applications)
- IT Polythioethers
(polysulfone-, aromatic; synthesis and characterization of highly
sulfonated polyarylenethioethersulfones for fuel
cell applications)
- IT Polysulfones, preparation
(polythioether-, aromatic; synthesis and characterization of highly
sulfonated polyarylenethioethersulfones for fuel
cell applications)
- IT 689262-96-2DP, endcapped with phenyl-based monohalides
689263-01-2DP, reaction products with phenyl-based
monohalides
(acid form; synthesis and characterization of highly
sulfonated polyarylenethioethersulfones for fuel
cell applications)
- IT 584-08-7, Potassium carbonate
(synthesis and characterization of highly sulfonated
polyarylenethioethersulfones for fuel cell
applications)
- IT 126-33-0, Sulfolane
(synthesis and characterization of highly sulfonated
polyarylenethioethersulfones for fuel cell
applications)
- IT 689262-96-2P 689262-99-5DP, reaction products with
phenyl-based monohalides 689263-01-2P
(synthesis and characterization of highly sulfonated
polyarylenethioethersulfones for fuel cell
applications)
- IT 64-19-7, Acetic acid, reactions 80-07-9, 4-Chlorophenyl sulfone
134-85-0, 4-Chlorobenzophenone 345-83-5, 4-Fluorobenzophenone
383-29-9, 4-Fluorophenyl sulfone 1310-73-2, Sodium hydroxide,
reactions 7647-14-5, Sodium chloride, reactions 7664-93-9
, Sulfuric acid, reactions 19362-77-7, 4,4'-Thiobisbenzenethiol

51698-33-0

(synthesis and characterization of highly sulfonated
polyarylenethioethersulfones for fuel cell
applications)

IT 301155-59-9P

(synthesis and characterization of highly sulfonated
polyarylenethioethersulfones for fuel cell
applications)

RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	File
Dang, T	2003	89	508	ACS National Meeting	HCA
Dimitrova, P	2002	150	115	Solid State Ionics	HCA
Matsumura, S	2001	34	2848	Macromolecules	HCA
Rikukawa, M	2000	25	1463	Prog Polym Sci	HCA
Schechter, A	2002	147	1815	Solid State Ionics	
Wainright, J	1995	142	L121	J Electrochem Soc	HCA
Wang, F	2002	197	231	Journal of Membrane	HCA
Wang, J	1996	41	193	Electrochimica Acta	HCA
Wiles, K	2002	43	993	ACS National Meeting	HCA
Zawodzinski, T	1991	95	6040	Phys Chem	HCA

OS.CITING REF COUNT: 9 THERE ARE 9 CAPLUS RECORDS THAT CITE THIS
RECORD (9 CITINGS)

L102 ANSWER 8 OF 15 HCA COPYRIGHT 2010 ACS on STN

ACCESSION NUMBER: 140:149010 HCA Full-text

TITLE: Sulfonation of poly(phthalazinones) with fuming
sulfuric acid mixtures for proton exchange
membrane materials

AUTHOR(S): Gao, Yan; Robertson, Gilles P.; Guiver, Michael
D.; Jian, Xigao; Mikhailenko, Serguei D.; Wang,
Keping; Kaliaguine, Serge

CORPORATE SOURCE: Institute for Chemical Process and Environmental
Technology, National Research Council, Ottawa,
ON, K1A 0R6, Can.

SOURCE: Journal of Membrane Science (2003),
227(1-2), 39-50
CODEN: JMESDO; ISSN: 0376-7388

PUBLISHER: Elsevier Science B.V.

DOCUMENT TYPE: Journal

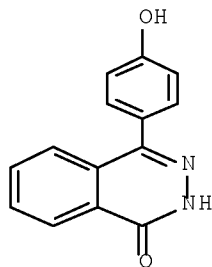
LANGUAGE: English

AB As a novel class of proton exchange membrane (PEM) materials for use in fuel
cells, sulfonated poly(phthalazinones) (SPPs), including sulfonated
poly(phthalazinone ether sulfones) (SPPEs), sulfonated poly(phthalazinone
ether ketones) (SPPEKs) and sulfonated poly(phthalazinone ether sulfone
ketones) (SPPEKs), were prepared by modification of corresponding
poly(phthalazinones) (PPs). Sulfonation reactions were conducted at room
temperature using mixts. of 95-98% concentrated sulfuric acid and 27-33%
fuming sulfuric acid with different acid ratios to get SPPs with degree of
sulfonation (DS) in the desired range of 1.00-1.37. The presence of sulfonic
acid groups in SPPs was confirmed by FTIR anal., and the DS and structures
were characterized by NMR. The introduction of sulfonic groups into the
polymer chains decreased the decomposition temperature. Membrane films were
cast from SPPs solution in N,N-dimethylacetamide (DMAc). Water uptakes and
swelling ratios of SPPs membrane films increased with DS and temperature
Proton conductivities of all SPPs increased with DS and temperature, reaching
>10⁻² S cm⁻¹ at around DS 1.0.

IT 212967-53-8P
(PPEK; sulfonation of poly(phthalazinones) with fuming
sulfuric acid mixts. for proton exchange membrane
materials)
RN 212967-53-8 HCA
CN 1(2H)-Phthalazinone, 4-(4-hydroxyphenyl)-, polymer with
1,4-benzenediol and bis(4-fluorophenyl)methanone (CA INDEX NAME)

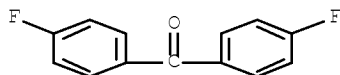
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CRN 152594-70-2
CMF C14 H10 N2 O2



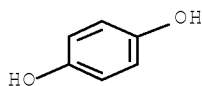
CM 2

CRN 345-92-6
CMF C13 H8 F2 O



CM 3

CRN 123-31-9
CMF C6 H6 O2

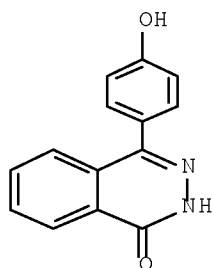


IT 212967-53-8DP, sulfonated
(SPPEK; sulfonation of poly(phthalazinones) with fuming
sulfuric acid mixts. for proton exchange membrane
materials)
RN 212967-53-8 HCA
CN 1(2H)-Phthalazinone, 4-(4-hydroxyphenyl)-, polymer with
1,4-benzenediol and bis(4-fluorophenyl)methanone (CA INDEX NAME)

CM 1

CRN 152594-70-2

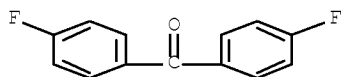
CMF C14 H10 N2 O2



CM 2

CRN 345-92-6

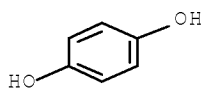
CMF C13 H8 F2 O



CM 3

CRN 123-31-9

CMF C6 H6 O2



- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 35, 38, 76
- ST sulfonation poly phthalazinone fuming sulfuric acid proton exchange
membrane; fuel cell separator
polysulfone ether ketone phthalazinone swelling cond
- IT Membranes, nonbiological
(elec. conductive; sulfonation of poly(phthalazinones) with
fuming sulfuric acid mixts. for proton exchange membrane
materials)
- IT Solubility
(in various solvents; sulfonation of poly(phthalazinones) with
fuming sulfuric acid mixts. for proton exchange membrane
materials)
- IT Polysulfones, preparation

- (polyether-, ketone group-containing, aryl-, phthalazinones; sulfonation of poly(phthalazinones) with fuming sulfuric acid mixts. for proton exchange ~~membrane~~ materials)
- IT Polysulfones, preparation
(polyether-, phthalazinones; sulfonation of poly(phthalazinones) with fuming sulfuric acid mixts. for proton exchange ~~membrane~~ materials)
- IT Polyketones
(polyether-, poly(phthalazinone ether ketone); sulfonation of poly(phthalazinones) with fuming sulfuric acid mixts. for proton exchange ~~membrane~~ materials)
- IT Polyketones
(polyether-, sulfonated, poly(phthalazinone ether ketone); sulfonation of poly(phthalazinones) with fuming sulfuric acid mixts. for proton exchange ~~membrane~~ materials)
- IT Polyethers, preparation
(polyketone-, poly(phthalazinone ether ketone); sulfonation of poly(phthalazinones) with fuming sulfuric acid mixts. for proton exchange ~~membrane~~ materials)
- IT Polyethers, preparation
(polyketone-, sulfonated, poly(phthalazinone ether ketone); sulfonation of poly(phthalazinones) with fuming sulfuric acid mixts. for proton exchange ~~membrane~~ materials)
- IT Polysulfones, preparation
(polyoxyarylene-, sulfonated, poly(phthalazinone ether sulfone); sulfonation of poly(phthalazinones) with fuming sulfuric acid mixts. for proton exchange ~~membrane~~ materials)
- IT Polyethers, preparation
(polysulfone-, ketone group-containing, aryl-, phthalazinones; sulfonation of poly(phthalazinones) with fuming sulfuric acid mixts. for proton exchange ~~membrane~~ materials)
- IT Polyethers, preparation
(polysulfone-, phthalazinones; sulfonation of poly(phthalazinones) with fuming sulfuric acid mixts. for proton exchange ~~membrane~~ materials)
- IT Polyoxyarylenes
(polysulfone-, sulfonated, poly(phthalazinone ether sulfone); sulfonation of poly(phthalazinones) with fuming sulfuric acid mixts. for proton exchange ~~membrane~~ materials)
- IT Ionic conductivity
(proton; sulfonation of poly(phthalazinones) with fuming sulfuric acid mixts. for proton exchange ~~membrane~~ materials)
- IT Polysulfones, preparation
(sulfonated, polyaryl ether ketone-; sulfonation of poly(phthalazinones) with fuming sulfuric acid mixts. for proton exchange ~~membrane~~ materials)
- IT Decomposition
Fuel cell separators
Fuel cells
Sulfonation
Swelling, physical
(sulfonation of poly(phthalazinones) with fuming sulfuric acid mixts. for proton exchange ~~membrane~~ materials)
- IT 172402-80-1P
(PEESK; sulfonation of poly(phthalazinones) with fuming sulfuric acid mixts. for proton exchange ~~membrane~~ materials)
- IT 212967-53-8P
(PPEK; sulfonation of poly(phthalazinones) with fuming sulfuric acid mixts. for proton exchange ~~membrane~~ materials)

IT 166894-40-2P
(PPES; sulfonation of poly(phthalazinones) with fuming sulfuric acid mixts. for proton exchange ~~membrane~~ materials)

IT 172402-80-1DP, sulfonated
(SPEESK; sulfonation of poly(phthalazinones) with fuming sulfuric acid mixts. for proton exchange ~~membrane~~ materials)

IT 212967-53-8DP, sulfonated
(SPPEK; sulfonation of poly(phthalazinones) with fuming sulfuric acid mixts. for proton exchange ~~membrane~~ materials)

IT 166894-40-2DP, sulfonated
(SPPEK; sulfonation of poly(phthalazinones) with fuming sulfuric acid mixts. for proton exchange ~~membrane~~ materials)

IT 7732-18-5, Water, processes
(absorption of; sulfonation of poly(phthalazinones) with fuming sulfuric acid mixts. for proton exchange ~~membrane~~ materials)

IT 67-66-3, Chloroform, processes 67-68-5, Dimethylsulfoxide, processes 68-12-2, Dimethyl formamide, processes 75-09-2, Dichloromethane, processes 109-99-9, Tetrahydrofuran, processes 127-19-5, Dimethyl acetamide 872-50-4, N-Methylpyrrolidone, processes
(sulfonation of poly(phthalazinones) with fuming sulfuric acid mixts. for proton exchange ~~membrane~~ materials)

IT 8014-95-7, Fuming sulfuric acid
(sulfonation of poly(phthalazinones) with fuming sulfuric acid mixts. for proton exchange ~~membrane~~ materials)

RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	File
Dai, Y	2001	79	1685	J Appl Polym Sci	HCA
Dai, Y	2002	207	189	J Membr Sci	HCA
Faure, S	1997		818	Proceedings of the S	HCA
Gao, Y	2003	41	2731	J Polym Sci A: Polym	HCA
Gao, Y	2003	41	497	J Polym Sci A: Polym	HCA
Genies, C	2001	42	359	Polymer	HCA
Glipa, X	1997	97	323	Solid State Ionics	HCA
Helmer-Metzmann, F	1995			US 5438082	HCA
Huang, R	2001	82	2651	J Appl Polym Sci	HCA
Jian, X	1993			CN 931091799	
Jian, X	1993			CN 931091802	
Jones, D	2001	185	41	J Membr Sci	HCA
Kerres, J	1996	34	2421	J Polym Sci A: Polym	HCA
Kobayashi, T	1998	106	219	Solid State Ionics	HCA
Meng, Y	1998	68	137	J Appl Polym Sci	HCA
Meng, Y	1999	37	1781	J Polym Sci A: Polym	HCA
Miyatake, K	2001	39	3211	J Polym Sci A: Polym	HCA
Nolte, R	1993	83	211	J Membr Sci	HCA
Nunes, S	2002	203	215	J Membr Sci	HCA
Soczka-Guth, T	1999			WO 9929763	HCA
Ueda, M	1993	31	853	J Appl Polym Sci	HCA
Wang, F	2002	197	231	J Membr Sci	HCA
Wilhelm, F	2002	199	167	J Membr Sci	HCA
Yen, S	1998			US 5769496	
Zaidi, S	2000	173	17	J Membr Sci	HCA

OS.CITING REF COUNT: 51 THERE ARE 51 CAPLUS RECORDS THAT CITE THIS RECORD (51 CITINGS)

L102 ANSWER 9 OF 15 HCA COPYRIGHT 2010 ACS on STN
 ACCESSION NUMBER: 139:367516 HCA Full-text
 TITLE: Varnish composition for fuel
 cell electrodes.
 INVENTOR(S): Higami, Makoto; Goto, Kohei; Kanaoka, Osayuki;
 Takahashi, Ryoichiro; Asano, Yoichi; Kakutani,
 Osamu; Okiyama, Hajime
 PATENT ASSIGNEE(S): JSR Ltd., Japan; Honda Motor Co., Ltd.
 SOURCE: Jpn. Kokai Tokkyo Koho, 17 pp.
 CODEN: JKXXAF
 DOCUMENT TYPE: Patent
 LANGUAGE: Japanese
 FAMILY ACC. NUM. COUNT: 3
 PATENT INFORMATION:

PATENT NO. -----	KIND ----	DATE -----	APPLICATION NO. -----	DATE
JP 2003317749	A	20031107	JP 2002-122822	200204 24
			<--	
JP 3994024	B2	20071017		
DE 10318398	A1	20031204	DE 2003-10318398	200304 23
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DE 10318398	B4	20080521		
US 20040028806	A1	20040212	US 2003-420968	200304 23
			<--	
US 20060269655	A1	20061130	US 2006-498173	200608 03
			<--	
PRIORITY APPLN. INFO.:			JP 2002-122822	A 200204 24
			<--	
			JP 2002-122823	A 200204 24
			<--	
			JP 2002-122824	A 200204 24
			<--	
			US 2003-420968	A3 200304 23
			<--	
AB	The disclosed varnish composition comprises sulfonated polymer, water, an organic solvent which is as good solvent for the polymer, and another solvent whose b. p. is $\geq 50^\circ$ but lower than that of the good solvent. The varnish composition gives uniform proton-conductive membranes on the fuel cell electrodes.			
IT	463963-71-5D, sulfonated (mixed solvents for sulfonated polymer varnish for			

fuel cell proton-conductive membranes

)

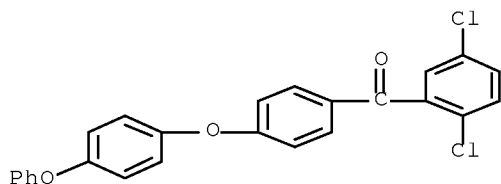
RN 463963-71-5 HCA

CN Methanone, bis(4-chlorophenyl)-, polymer with
 (2,5-dichlorophenyl)[4-(4-phenoxyphenoxy)phenyl]methanone and
 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol]
 (9CI) (CA INDEX NAME)

CM 1

CRN 463954-50-9

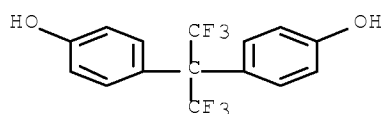
CMF C25 H16 Cl2 O3



CM 2

CRN 1478-61-1

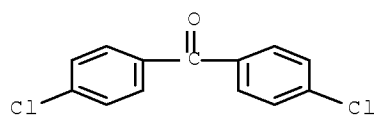
CMF C15 H10 F6 O2



CM 3

CRN 90-98-2

CMF C13 H8 Cl2 O



IPCI H01M0008-02 [I,A]; H01M0008-10 [I,A]; C09D0171-00 [N,A]
 IPCR H01M0008-02 [I,C*]; H01M0008-02 [I,A]; H01M0008-10 [I,C*];
 H01M0008-10 [I,A]; C09D0171-00 [N,C]; C09D0171-00 [N,A]
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 Section cross-reference(s): 42
 ST solvent mixt sulfonated polymer varnish fuel cell
 electrode
 IT Varnishes

(for formation of sulfonated polymer type proton conductive
membranes for fuel cells)

IT Solvents

(for varnishes for forming proton-conductive membranes
on fuel cell electrode)

IT Fuel cell electrodes

(solvent mixture for varnishes for forming proton-conductive
membranes on)

IT 78-93-3, Methyl ethyl ketone, uses 109-99-9, Tetrahydrofuran, uses
110-71-4 872-50-4, N-Methyl-2-pyrrolidone, uses 7732-18-5,
Water, uses

(mixed solvents for sulfonated polymer varnish for fuel
cell proton-conductive membranes)

IT 463963-71-5D, sulfonated

(mixed solvents for sulfonated polymer varnish for
fuel cell proton-conductive membranes
)

L102 ANSWER 10 OF 15 HCA COPYRIGHT 2010 ACS on STN

ACCESSION NUMBER: 139:215541 HCA Full-text

TITLE: Procedure for the production of composite
membranes from branched
polyalkoxysiloxanes

INVENTOR(S): Cui, Wei; Goedel, Werner A.; Jaumann, Manfred;
Moeller, Martin; Muzzafarow, Assiz

PATENT ASSIGNEE(S): DaimlerChrysler AG, Germany

SOURCE: Ger. Offen., 24 pp.

CODEN: GWXXBX

DOCUMENT TYPE: Patent

LANGUAGE: German

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO. -----	KIND ----	DATE -----	APPLICATION NO. -----	DATE
DE 10207411	A1	20030904	DE 2002-10207411	200202 21
EP 1348478	A2	20031001	EP 2003-3310	200302 13
EP 1348478	A3	20050622		
EP 1348478	B1	20090506		
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK				
JP 2003288917	A	20031010	JP 2003-42899	200302 20
US 20040062966	A1	20040401	US 2003-371451	200302 20
US 6953634	B2	20051011		
PRIORITY APPLN. INFO.:			DE 2002-10207411	A 200202

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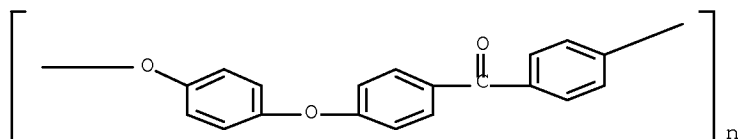
ASSIGNMENT HISTORY FOR US PATENT AVAILABLE IN LSUS DISPLAY FORMAT

AB The mech. strength of composite ~~membranes~~ based on organic polymer proton conductors is increased and the water swelling decreased by blending the proton conductors with branched polyalkoxysiloxanes such as tetraethoxysilane homopolymer.

IT 31694-16-3D, Victrex 450PF, sulfonated
(proton conductor; production of proton exchange polymer composite ~~membranes~~ from branched polyalkoxysiloxanes for fuel cells)

RN 31694-16-3 HCA

CN Poly(oxy-1,4-phenyleneoxy-1,4-phenylenecarbonyl-1,4-phenylene) (CA INDEX NAME)



IPCI C08J0005-18 [ICM,7]; C08L0083-12 [ICS,7]; C08L0083-00 [ICS,7,C*]; C08K0007-16 [ICS,7]; C08K0007-00 [ICS,7,C*]; H01M0008-02 [ICS,7]

IPCR B01D0069-00 [I,C*]; B01D0069-14 [I,A]; B01D0071-00 [I,C*]; B01D0071-00 [I,A]; B01D0071-52 [I,A]; B01D0071-70 [I,A]; C08J0005-20 [I,C*]; C08J0005-22 [I,A]; H01B0001-06 [I,C*]; H01B0001-06 [I,A]; H01B0013-00 [I,C*]; H01B0013-00 [I,A]; H01M0008-02 [I,C*]; H01M0008-02 [I,A]; H01M0008-10 [I,C*]; H01M0008-10 [I,A]

CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 52

ST polymer proton exchange composite ~~membrane~~ branched polyalkoxysiloxane strength enhancer; tetraethoxysilane homopolymer reinforcing agent polymer proton exchange composite ~~membrane~~

IT Polysiloxanes, uses
(alkoxy, branched; production of proton exchange polymer composite ~~membranes~~ from branched polyalkoxysiloxanes for fuel cells)

IT Polyketones
(polyether-, sulfonated, proton conductor; production of proton exchange polymer composite ~~membranes~~ from branched polyalkoxysiloxanes for fuel cells)

IT Polyethers, uses
(polyketone-, sulfonated, proton conductor; production of proton exchange polymer composite ~~membranes~~ from branched polyalkoxysiloxanes for fuel cells)

IT Fuel cell separators
(proton exchange, composite; production of proton exchange polymer composite ~~membranes~~ from branched polyalkoxysiloxanes for fuel cells)

IT 53201-03-9P, Sodium triethoxysilanolate
(monomer precursor; production of proton exchange polymer composite ~~membranes~~ from branched polyalkoxysiloxanes for fuel cells)

IT 27491-84-5P, Triethoxysilanol
(monomer; production of proton exchange polymer composite ~~membranes~~ from branched polyalkoxysiloxanes for fuel cells)

IT 204921-13-1P, Triethoxysilanol homopolymer
(production of proton exchange polymer composite ~~membranes~~
from branched polyalkoxysiloxanes for fuel
cells)

IT 11099-06-2P, Tetraethoxysilane homopolymer
(production of proton exchange polymer composite ~~membranes~~
from branched polyalkoxysiloxanes for fuel
cells)

IT 31694-16-3D, Victrex 450PF, sulfonated
(proton conductor; production of proton exchange polymer composite
~~membranes~~ from branched polyalkoxysiloxanes for
fuel cells)

OS.CITING REF COUNT: 3 THERE ARE 3 CAPLUS RECORDS THAT CITE THIS
RECORD (6 CITINGS)

L102 ANSWER 11 OF 15 HCA COPYRIGHT 2010 ACS on STN
ACCESSION NUMBER: 138:173274 HCA Full-text
TITLE: Proton conducting polymer ~~membranes~~
for fuel cell applications -
characterization of hydrated and development of
an hydrous materials

AUTHOR(S): Ise, M.; Schuster, M.; Meyer, W.; Schuster, M.;
Kreuer, K. D.; Maier, J.

CORPORATE SOURCE: Siemens AG, ZT EN 1, Erlangen, 91052, Germany

SOURCE: GDCh-Monographie (2000),
21(Elektrochemische Verfahren fuer Neue
Technologien), 239-247
CODEN: GDCHAI

PUBLISHER: Gesellschaft Deutscher Chemiker

DOCUMENT TYPE: Journal

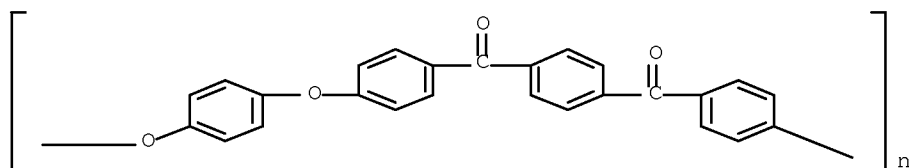
LANGUAGE: German

AB For the hydrated polymer electrolyte ~~membranes~~ Nafion 117 and 65% sulfonated
PEEKK, the transport properties for protons and water (proton conductivity,
electro-osmotic drag coefficient, water self-diffusion and water permeability)
were determined exptl., for the anal. of the microstructure SAXS measurements
were performed. For the same water content, the transport coeffs. are always
higher in Nafion than in sulfonated PEEKK ~~membranes~~ which show less
hydrophilic-hydrophobic separation Channel lattice models for the
microstructure and the dependence of the proton conductivity on the space
charge distribution of the protonic charge carriers are discussed
comparatively for both ~~membranes~~. As a first step in the development of
monomer-free ~~membranes~~ for operating temps. higher than 100°C, ethylene oxide
oligomers with two imidazole end groups have been synthesized which show,
after mixing with trifluoromethane sulfonic acid, a structure diffusion of
protonic charge carriers much faster than the self diffusion of the involved
mols.

IT 60015-03-4D, PEEKK, sulfonated
(proton conductivity, electro-osmotic drag coefficient, water self-
diffusion,
and water permeability of hydrated polymer electrolyte
~~membranes~~ Nafion 117 and 65% sulfonated PEEKK
for fuel cells)

RN 60015-03-4 HCA

CN Poly(oxy-1,4-phenyleneoxy-1,4-phenylenecarbonyl-1,4-
phenylenecarbonyl-1,4-phenylene) (CA INDEX NAME)



- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
- ST Nafion proton conducting polymer membrane fuel cell; fluorinated sulfonated hydrogenated polyoxyalkylene membrane fuel cell; imidazole ethylene oxide polymer membrane fuel cell
- IT Polymer chains
(flexible; preparation and characterization of monomer-free polymer membranes of ethylene oxide oligomers with two imidazole groups for fuel cells)
- IT Polyoxyalkylenes, uses
(fluorine- and sulfo-containing, ionomers; proton conductivity, electro-osmotic drag coefficient, water self-diffusion, and water permeability of hydrated polymer electrolyte membranes Nafion 117 and 65% sulfonated PEEKK for fuel cells)
- IT Diffusion
(hydrogen; proton conductivity, electro-osmotic drag coefficient, water self-diffusion, and water permeability of hydrated polymer electrolyte membranes Nafion 117 and 65% sulfonated PEEKK for fuel cells)
- IT Functional groups
(imidazolyl; preparation and characterization of monomer-free polymer membranes of ethylene oxide oligomers with two imidazole groups for fuel cells)
- IT Fluoropolymers, uses
(polyoxyalkylene-, sulfo-containing, ionomers; proton conductivity, electro-osmotic drag coefficient, water self-diffusion, and water permeability of hydrated polymer electrolyte membranes Nafion 117 and 65% sulfonated PEEKK for fuel cells)
- IT Ionomers
(polyoxyalkylenes, fluorine- and sulfo-containing; proton conductivity, electro-osmotic drag coefficient, water self-diffusion, and water permeability of hydrated polymer electrolyte membranes Nafion 117 and 65% sulfonated PEEKK for fuel cells)
- IT Hydrogen bond
Proton transfer
Solvation
(preparation and characterization of monomer-free polymer membranes of ethylene oxide oligomers with two imidazole groups for fuel cells)
- IT Conducting polymers
Electroosmosis
Fuel cell separators
Microstructure
Permeability
(proton conductivity, electro-osmotic drag coefficient, water self-

diffusion,

and water permeability of hydrated polymer electrolyte
membranes Nafion 117 and 65% sulfonated PEEKK for
fuel cells)

IT Ionic conductivity

(proton; proton conductivity, electro-osmotic drag coefficient, water
self-diffusion, and water permeability of hydrated polymer
electrolyte membranes Nafion 117 and 65% sulfonated
PEKK for fuel cells)

IT Diffusion

(self-; preparation and characterization of monomer-free polymer
membranes of ethylene oxide oligomers with two imidazole
groups for fuel cells)

IT 1333-74-0, Hydrogen, processes

(diffusion; proton conductivity, electro-osmotic drag coefficient, water
self-diffusion, and water permeability of hydrated polymer
electrolyte membranes Nafion 117 and 65% sulfonated
PEKK for fuel cells)

IT 496908-58-8P

(preparation and characterization of monomer-free polymer
membranes of ethylene oxide oligomers with two imidazole
groups for fuel cells)

IT 75-21-8, Ethylene oxide, reactions 288-32-4, Imidazole, reactions

(preparation and characterization of monomer-free polymer
membranes of ethylene oxide oligomers with two imidazole
groups for fuel cells)

IT 60015-03-4D, PEEKK, sulfonated 66796-30-3D,

Nafion 117, hydrated

(proton conductivity, electro-osmotic drag coefficient, water self-

diffusion,

and water permeability of hydrated polymer electrolyte
membranes Nafion 117 and 65% sulfonated PEEKK
for fuel cells)

IT 1493-13-6, Trifluoromethane sulfonic acid

(self-diffusion in; preparation and characterization of monomer-free
polymer membranes of ethylene oxide oligomers with two
imidazole groups for fuel cells)

RETABLE

Referenced Author	Year	VOL	PG	Referenced Work	
(RAU)	(RPY)	(RVL)	(RPG)	(RWK)	File

=====+=====+=====+=====+=====+=====+=====

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Anon				http://www.acdlabs.c	
Doyle, M	2000	147	34	J Electrochem Soc	HCA
Gebel, G	1997	30	7914	Macromolecules	HCA
Ise, M	2000			Dissertation Univers	
Ise, M	1999			Hasylab Annual Repor	
Ise, M	1999	125	213	Solid State Ionics	HCA
Kerres, J	1999	125	243	Solid State Ionics	HCA
Kreuer, K	1998	43	1281	Electrochim Acta	HCA
Kreuer, K				J Membrane Science	
Kreuer, K	1997	97	1	Solid State Ionics	HCA
Muench, W		10		Proc SSPC	
Paddison, S	2000	3	293	J New Mat Electroche	
Savado, O	1998	1	47	J New Mater Electroc	HCA
Wainright, J	1994	94	255	Proc Electrochem Soc	
Zaidi, S	2000	173	17	J Membrane Science	HCA

October 25, 2010

10/551,576

66

ACCESSION NUMBER: 137:110259 HCA Full-text
 TITLE: Ionic group-containing polymers and their
 polyelectrolyte moldings and ~~membranes~~
 with good durability and processability
 INVENTOR(S): Kitamura, Kota; Taguchi, Hiroaki; Sakaguchi,
 Yoshimitsu; Nakao, Junko
 PATENT ASSIGNEE(S): Toyobo Co., Ltd., Japan
 SOURCE: Jpn. Kokai Tokkyo Koho, 11 pp.
 CODEN: JKXXAF
 DOCUMENT TYPE: Patent
 LANGUAGE: Japanese
 FAMILY ACC. NUM. COUNT: 1
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
-----	----	-----	-----	

JP 2002206024	A	20020726	JP 2001-2664	200101 10

PRIORITY APPLN. INFO.: <-- JP 2001-2664
 200101
 10

AB The polymers, useful as ion-exchange ~~membranes~~ for fuel cells, etc., show ionic group content ≥ 2.5 meq/g, logarithmic viscosity (at 25° in 0.05 dL/g methanesulfonic acid solution) ≥ 0.1 dL/g, weight loss after immersion in water at 25° $\leq 5\%$, solubility in dimethylsulfoxide at 40° $\geq 1\%$, and ion conductivity (at 80° and relative humidity 95%, and a.c. impedance 10,000 Hz) ≥ 0.3 S/cm. Thus, polymerization of 4,6-diaminoresorcinol dihydrochloride, monosodium 2,5-dicarboxybenzene sulfonate, and terephthalic acid gave a copolymer (logarithmic viscosity 2.13 dL/g, ionic group content 3.1 meq/g, weight loss 2.3%), which was dissolved in dimethylsulfoxide and cast on a glass plate to give a film with ion conductivity 0.75 S/cm.

IT 424821-44-3P, 4,6-Diaminoresorcinol dihydrochloride-monosodium 2,5-dicarboxybenzene sulfonate -terephthalic acid copolymer 442634-27-7P, 4,6-Diaminoresorcinol dihydrochloride-4,4'-Dicarboxydiphenyl sulfone-monosodium 2,5-dicarboxybenzene sulfonate copolymer

(ionic group-containing polymers for polyelectrolyte moldings and ~~membranes~~ with good durability and processability)

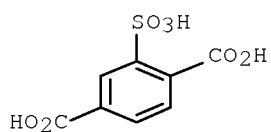
RN 424821-44-3 HCA

CN 1,4-Benzenedicarboxylic acid, 2-sulfo-, monosodium salt, polymer with 1,4-benzenedicarboxylic acid and 4,6-diamino-1,3-benzenediol dihydrochloride (9CI) (CA INDEX NAME)

CM 1

CRN 19089-60-2

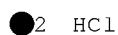
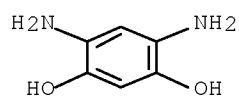
CMF C8 H6 O7 S . Na



CM 2

CRN 16523-31-2

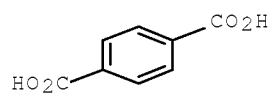
CMF C6 H8 N2 O2 . 2 Cl H



CM 3

CRN 100-21-0

CMF C8 H6 O4



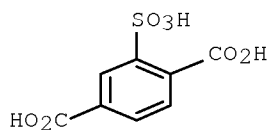
RN 442634-27-7 HCA

CN 1,4-Benzenedicarboxylic acid, 2-sulfo-, monosodium salt, polymer
with 4,6-diamino-1,3-benzenediol dihydrochloride and
4,4'-sulfonylbis[benzoic acid] (9CI) (CA INDEX NAME)

CM 1

CRN 19089-60-2

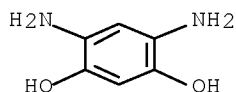
CMF C8 H6 O7 S . Na



CM 2

CRN 16523-31-2

CMF C6 H8 N2 O2 . 2 Cl H

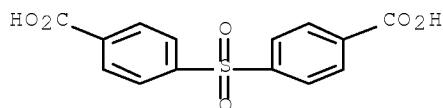


●2 HCl

CM 3

CRN 2449-35-6

CMF C14 H10 O6 S



- IPCI C08G0073-06 [ICM,7]; C08G0073-00 [ICM,7,C*]; C08G0075-32 [ICS,7];
 C08G0075-00 [ICS,7,C*]; C08J0005-22 [ICS,7]; C08J0005-20 [ICS,7,C*];
 H01M0008-02 [ICS,7]; C08L0079-04 [ICS,7]; C08L0079-00 [ICS,7,C*];
 C08L0081-00 [ICS,7]
- IPCR C08J0005-20 [I,C*]; C08J0005-22 [I,A]; C08G0073-00 [I,C*];
 C08G0073-06 [I,A]; C08G0075-00 [I,C*]; C08G0075-32 [I,A];
 H01M0008-02 [I,C*]; H01M0008-02 [I,A]
- CC 38-3 (Plastics Fabrication and Uses)
 Section cross-reference(s): 52
- ST polyelectrolyte solid fuel cell ion exchanger
 polybenzoxazole; aminoresorcinol hydrochloride sodium carboxybenzene
 sulfonate terephthalic polymer; ionic conducting film
 polybenzoxazole polyelectrolyte
- IT Films
 (elec. conductive; ionic group-containing polymers for
 polyelectrolyte moldings and membranes with good
 durability and processability)
- IT Electric conductors
 (films; ionic group-containing polymers for polyelectrolyte moldings
 and membranes with good durability and processability)
- IT Fuel cell electrolytes
 Ion exchange membranes
 (ionic group-containing polymers for polyelectrolyte moldings and
 membranes with good durability and processability)
- IT Polybenzoxazoles
 (ionic group-containing polymers for polyelectrolyte moldings and

membranes with good durability and processability)

IT Molded plastics, uses
(ionic group-containing polymers for polyelectrolyte moldings and membranes with good durability and processability)

IT Polysulfones, uses
(polybenzoxazole-; ionic group-containing polymers for polyelectrolyte moldings and membranes with good durability and processability)

IT Polybenzoxazoles
(polysulfone-; ionic group-containing polymers for polyelectrolyte moldings and membranes with good durability and processability)

IT Polyelectrolytes
(solid; ionic group-containing polymers for polyelectrolyte moldings and membranes with good durability and processability)

IT 424821-44-3P, 4,6-Diaminoresorcinol
dihydrochloride-monosodium 2,5-dicarboxybenzene sulfonate
-terephthalic acid copolymer 426255-56-3P 442634-26-6P
442634-27-7P, 4,6-Diaminoresorcinol
dihydrochloride-4,4'-Dicarboxydiphenyl sulfone-monosodium
2,5-dicarboxybenzene sulfonate copolymer
(ionic group-containing polymers for polyelectrolyte moldings and membranes with good durability and processability)

L102 ANSWER 13 OF 15 HCA COPYRIGHT 2010 ACS on STN

ACCESSION NUMBER: 136:121088 HCA Full-text

TITLE: Electrolyte membrane-electrode
laminate for solid polymer electrolyte
fuel cell

INVENTOR(S): Fukuda, Kaoru; Asano, Yoichi; Kanaoka, Osayuki;
Saito, Nobuhiro; Nanaumi, Masaaki

PATENT ASSIGNEE(S): Honda Motor Co., Ltd., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 9 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 2

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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JP 2002025581	A	20020125	JP 2000-204131	200007 05
			<--	
JP 3535455	B2	20040607		
US 20020045081	A1	20020418	US 2001-897426	200107 03
			<--	
CA 2352356	A1	20020105	CA 2001-2352356	200107 04
			<--	
CA 2352356	C	20070220		
DE 10132434	A1	20020508	DE 2001-10132434	200107 04
			<--	

October 25, 2010

10/551,576

70

DE 10132434

B4

20071213

PRIORITY APPLN. INFO.:

JP 2000-204131

A

200007
05

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JP 2000-256157

A

200008
25

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ASSIGNMENT HISTORY FOR US PATENT AVAILABLE IN LSUS DISPLAY FORMAT

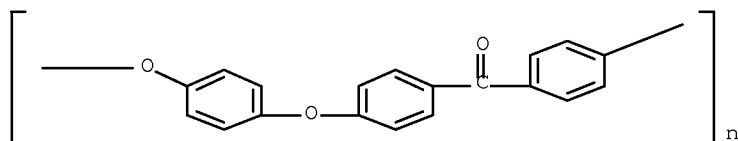
AB The laminate has an electrolyte ~~membrane~~ held between a ~~cathode~~ and an ~~anode~~, where the electrolyte ~~membrane~~ and the ~~electrodes~~ contain F-free soluble aromatic hydrocarbon polymer ion exchangers. The ion exchanger in the ~~electrodes~~ may have higher solubility than that in the electrolyte ~~membrane~~.

IT 31694-16-3, Peek

(sulfonated; non-fluoropolymer soluble ion exchangers in electrolyte ~~membrane-electrode~~ laminates for polymer electrolyte fuel cells)

RN 31694-16-3 HCA

CN Poly(oxy-1,4-phenyleneoxy-1,4-phenylenecarbonyl-1,4-phenylene) (CA INDEX NAME)



IPCI H01M0008-02 [ICM,7]; H01M0008-10 [ICS,7]; B01D0069-12 [ICS,7]; B01D0069-00 [ICS,7,C*]

IPCR B01D0069-00 [I,C*]; B01D0069-12 [I,A]; B01J0038-00 [I,C*]; B01J0038-00 [I,A]; B29B0017-02 [I,C*]; B29B0017-02 [I,A]; B29K0105-26 [N,A]; H01M0008-02 [I,C*]; H01M0008-02 [I,A]; H01M0008-04 [I,C*]; H01M0008-04 [I,A]; H01M0008-10 [I,C*]; H01M0008-10 [I,A]

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST fuel cell polymer electrolyte electrode laminate ion exchanger

IT Fuel cells

(non-fluoropolymer soluble ion exchangers in electrolyte ~~membrane-electrode~~ laminates for polymer electrolyte fuel cells)

IT Polyimides, uses

(polyether-, sulfonated; non-fluoropolymer soluble ion exchangers in electrolyte ~~membrane-electrode~~ laminates for polymer electrolyte fuel cells)

IT Polyethers, uses

(polyimide-, sulfonated; non-fluoropolymer soluble ion exchangers in electrolyte ~~membrane-electrode~~ laminates for polymer electrolyte fuel cells)

IT Polyoxyphenylenes

Polysulfones, uses

Polythiophenylenes

(sulfonated; non-fluoropolymer soluble ion exchangers in electrolyte ~~membrane-electrode~~ laminates for polymer electrolyte fuel cells)

IT 25212-74-2, Poly(phenylene sulfide) 25667-42-9 31694-16-3

, Peek

(sulfonated; non-fluoropolymer soluble ion exchangers in electrolyte ~~membrane-electrode~~ laminates for polymer electrolyte fuel cells)

L102 ANSWER 14 OF 15 HCA COPYRIGHT 2010 ACS on STN

ACCESSION NUMBER: 133:137819 HCA Full-textTITLE: Electrochemical characterisation of sulfonated polyetherketone ~~membranes~~

AUTHOR(S): Bauer, B.; Jones, D. J.; Roziere, J.; Tchicaya, L.; Alberti, G.; Casciola, M.; Massinelli, L.; Peraio, A.; Besse, S.; Ramunni, E.

CORPORATE SOURCE: Gesellschaft fur funktionelle Membranen und Anlagentechnologie GmbH, St. Ingbert, 66386, Germany

SOURCE: Journal of New Materials for Electrochemical Systems (2000), 3(2), 93-98

CODEN: JMESFQ; ISSN: 1480-2422

PUBLISHER: Journal of New Materials for Electrochemical Systems

DOCUMENT TYPE: Journal

LANGUAGE: English

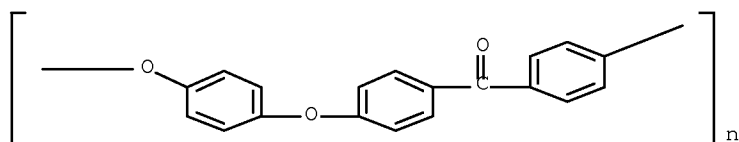
AB The thermal, mech., and electrochem. characterization of sulfonated poly(ether ketone) ~~membranes~~ (PEEK-Ss), including fuel cell tests in hydrogen/oxygen and hydrogen/air, are described. In thermogravimetric anal., PEEK-S ~~membranes~~ lose water up to 150°, and degradation of the sulfonic acid groups takes place at .apprx.240°. Thermomech. anal. of a PEEK-S ~~membrane~~ of 60 µm thickness and equivalent weight 625 g/mol shows that the ~~membrane~~ undergoes a shrinkage of 1.5% up to 140°. Reversible elongation of 0.6% occurs thereafter up to 180°. The conductivity, measured by impedance spectroscopy, on non-reinforced and on woven polymer-reinforced PEEK-S, is reported as a function of temperature and of relative humidity (RH), and compared with that of Nafion-117. At 100° and 100% RH the conductivity of PEEK-S is 2-5.10-2 S/cm (depending on thermal history), increasing to 0.11 S/m at 150°. Polarization characteristics of a non-reinforced PEEK-S ~~membrane~~ of 18 µm thickness at temps. up to 110° under conditions of hydrogen/air and hydrogen/oxygen are compared. The results of fuel cell (H2-O2) tests on composite, reinforced ~~membranes~~ are reported.

IT 31694-16-3D, Poly(oxy-1,4-phenyleneoxy-1,4-phenylenecarbonyl-1,4-phenylene), sulfonated

(thermal, mech., and electrochem. characterization of sulfonated poly(ether ketone) ~~membranes~~ in relation to fuel cell use)

RN 31694-16-3 HCA

CN Poly(oxy-1,4-phenyleneoxy-1,4-phenylenecarbonyl-1,4-phenylene) (CA INDEX NAME)



CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

ST sulfonated polyether ketone ~~membrane~~ thermal mech
electrochem property; heat resistance sulfonated PEEK

membrane fuel cell use; mech property
 sulfonated PEEK membrane fuel cell
 use; elec cond sulfonated PEEK membrane fuel
 cell use

IT Polyketones

Polyketones

(polyether-, aromatic; thermal, mech., and electrochem.
 characterization of sulfonated poly(ether ketone)
 membranes in relation to fuel cell
 use)

IT Polyethers, uses

Polyethers, uses

(polyketone-, aromatic; thermal, mech., and electrochem.
 characterization of sulfonated poly(ether ketone)
 membranes in relation to fuel cell
 use)

IT Humidity

(relative; thermal, mech., and electrochem. characterization of
 sulfonated poly(ether ketone) membranes in relation to
 fuel cell use and)

IT Electric conductivity

Fuel cells

Heat-resistant materials

(thermal, mech., and electrochem. characterization of sulfonated
 poly(ether ketone) membranes in relation to
 fuel cell use)

IT Polymer degradation

(thermal; thermal, mech., and electrochem. characterization of
 sulfonated poly(ether ketone) membranes in relation to
 fuel cell use)

IT 1333-74-0, Hydrogen, properties

(-air; polarization of sulfonated poly(ether ketone)
 membranes in presence of hydrogen-air in relation to
 fuel cell use)

IT 7782-44-7, Oxygen, properties

(hydrogen-; polarization of sulfonated poly(ether ketone)
 membranes in presence of hydrogen-oxygen in relation to
 fuel cell use)

IT 31694-16-3D, Poly(oxy-1,4-phenyleneoxy-1,4-phenylenecarbonyl-1,4-phenylene), sulfonated

(thermal, mech., and electrochem. characterization of
 sulfonated poly(ether ketone) membranes in
 relation to fuel cell use)

RETABLE

Referenced Author	Year	VOL	PG	Referenced Work	
Referenced					
(RAU)	(RPY)	(RVL)	(RPG)	(RWK)	File

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Buchi, F	1995	40	345	Electrochimica Acta	HCA
Faure, S				FR 9605707	
Flint, S	1997	97	299	Solid State Ionics	HCA
Glipa, X	1997	97	323	Solid State Ionics	HCA
Gupta, B	1994	48	127	Chimia	HCA
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Jones, D	1996	1-2	115	Envt Res Forum	HCA
Kabayashi, T	1998	106	219	Solid State Ionics	
Kolde, J	1995	95-23	193	The Electrochemical	HCA

Kreuer, K	1995 95	241	Proc Electrochem Soc
Linkous, C	1998 23	525	Int J Hydrogen Energ HCA
Nolte, R	1993 83	211	J Membrane Sci HCA
Ostrovskii, D	1997 97	315	Solid State Ionics HCA
Savadogo, O	1998 1	47	J New Mat Electroche HCA
Steck, A	1997	792	Proceedings of the S HCA

OS.CITING REF COUNT: 101 THERE ARE 101 CAPLUS RECORDS THAT CITE
THIS RECORD (102 CITINGS)

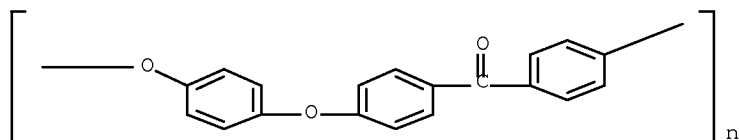
L102 ANSWER 15 OF 15 HCA COPYRIGHT 2010 ACS on STN
 ACCESSION NUMBER: 130:82473 HCA Full-text
 TITLE: Development and characterization of ion-exchange
 polymer blend ~~membranes~~
 AUTHOR(S): Cui, W.; Kerres, J.; Eigenberger, G.
 CORPORATE SOURCE: Institut fur Chemische Verfahrenstechnik,
 Universitat Stuttgart, Stuttgart, D-70199,
 Germany
 SOURCE: Separation and Purification Technology (
 1998), 14(1-3), 145-154
 CODEN: SPUTFP; ISSN: 1383-5866
 PUBLISHER: Elsevier Science B.V.
 DOCUMENT TYPE: Journal
 LANGUAGE: English

AB In the presented paper, the preparation and characterization of new ionomer blend ~~membranes~~ containing sulfonated poly(ether ether ketone) PEEK Victrex is described. The second blend components were Polysulfone Udel-ortho-sulfone-diamine, polyamide PA Trogamid P (producer: Huls) and poly(ether imide) PEI Ultem (producer: General Elec.). In the blend ~~membranes~~ swelling was reduced by specific interaction, in the case of the blend components PA and PEI hydrogen bonds, and in the case of the blend component PS-U-NH2 (partial) poly salt formation, leading to electrostatic interaction between the blend component macromols., and hydrogen bonds. The acid-base interactions also led to decrease of ionic conductivity by partial blocking of SO3- groups for cation transport, compared with the ionic conductivity of the hydrogen bond blends. The acid-base blends showed better ion permselectivities than the hydrogen bond blends, even at high electrolyte concns., and thus better performance in electrodialysis. The thermal stability of the investigated blends was very good and in the case of the acid-base blends even better than the thermal stability of pure PEEK-SO3H. DSC traces of the blend ~~membranes~~ showed only one Tg. In addition, the ~~membranes~~ are transparent to visible light. But therefrom it cannot be concluded that the blend components are miscible to the mol. level: at the acid-base blends, the Tg of PEEK-SO3H is very similar to the Tg of PS-U-NH2, and in the investigated hydrogen bond blends, the portion of PA or PEI, resp., might be too low to be detected by DSC. The investigated blend ~~membranes~~ showed similar performance as the com. cation-exchange ~~membrane~~ C MX in electrodialysis (ED) application. The performance of the acid-base blend ~~membrane~~ is better than the performance of the hydrogen bonded PEEK-PA blend, especially in the ED experiment applying the higher NaCl concentration. This is mainly due to the lower swelling and thus better ion permselectivity of the acid-base blend ~~membrane~~, compared with the PEEK-PA blend. To get a deeper insight into the microphase structure of the investigated blends, dynamic mech. analyses and TEM investigations of the prepared blend ~~membranes~~ are planned. In addition, due to their promising properties, the preparation of arylene main-chain acid-base blends with other polymeric acidic and basic components is planned. Furthermore, the acid-base blend ~~membranes~~ will be tested in H2 polymer electrolyte fuel cells and direct methanol fuel cells, because preliminary tests have shown that they have a good perspective in this application.

IT 31694-16-3D, PEEK, sulfonated
 (Victrex; development and characterization of ion-exchange

polymer blend membranes)

RN 31694-16-3 HCA

CN Poly(oxy-1,4-phenyleneoxy-1,4-phenylenecarbonyl-1,4-phenylene) (CA
INDEX NAME)

CC 38-3 (Plastics Fabrication and Uses)

ST ion exchange polymer blend membrane; sulfonated PEEK blend
ion exchange membrane; polyether polyketone sulfonated
blend ion exchange; polyimide polyether blend ion exchange; aminated
polysulfone blend ion exchange

IT Cation exchange membranes

Electric resistance

Glass transition temperature

Ion exchange membranes

Swelling, physical

Thermal stability

(development and characterization of ion-exchange polymer blend
membranes)

IT Ionomers

Polyamides, uses

Polymer blends

(development and characterization of ion-exchange polymer blend
membranes)

IT Dialyzers

Dialyzers

(electrodialyzers, membranes; development and
characterization of ion-exchange polymer blend membranes
)

IT Polysulfones, uses

Polysulfones, uses

(polyether-, aminated; development and characterization of
ion-exchange polymer blend membranes)

IT Polyketones

Polyketones

(polyether-, aromatic, sulfonated; development and characterization
of ion-exchange polymer blend membranes)

IT Polyimides, uses

Polyimides, uses

(polyether-; development and characterization of ion-exchange
polymer blend membranes)

IT Polyethers, uses

Polyethers, uses

(polyimide-; development and characterization of ion-exchange
polymer blend membranes)

IT Polyethers, uses

Polyethers, uses

(polyketone-, aromatic, sulfonated; development and characterization
of ion-exchange polymer blend membranes)

IT Polyethers, uses

Polyethers, uses

(polysulfone-, aminated; development and characterization of

ion-exchange polymer blend membranes)

IT Permeability
(selective, ionic; development and characterization of
ion-exchange polymer blend membranes)

IT 25054-12-0, Nylon 6-3-T
(Trogamid P; development and characterization of ion-exchange
polymer blend membranes)

IT 31694-16-3D, PEEK, sulfonated
(Vitrex; development and characterization of ion-exchange
polymer blend membranes)

IT 25135-51-7D, Udel P 3500, aminated 25154-01-2D,
4,4'-Dichlorodiphenylsulfone-diphenylolpropane copolymer, aminated
61128-24-3, Ultem 61128-46-9
(development and characterization of ion-exchange polymer blend
membranes)

IT 7647-14-5, Sodium chloride, uses
(permselectivity of; development and characterization of
ion-exchange polymer blend membranes)

RETABLE

Referenced Author Referenced (RAU)	Year	VOL	PG	Referenced Work (RWK)	File
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Eisenbach, C	1995	36	795	ACS Polym Prepr Div	HCA
Eisenbach, C	1994	15	117	Macromol Rapid Commu	HCA
Guiver, M	1995	28	7612	Macromolecules	HCA
Helmer-Metzmann, F	1993			EP 0574791	HCA
Katime, I	1996	5	3097	Polymeric Materials	
Kerres, J				submitted to J Polym	
Kusomoto, K	1976	8	225	Polym J	
McRae, W	1960			US 2962454	HCA
Nolte, R	1993	83	211	J Membr Sci	HCA
Smith, P	1983	21	223	J Polym Sci: Polym L	HCA
OS.CITING REF COUNT:	92	THERE ARE 92 CAPLUS RECORDS THAT CITE THIS RECORD (92 CITINGS)			

----- (UNIQUE MOIETIES OF CLAIM 4) -----

=> D L94 1-11 IBIB ABS HITSTR HITIND RETABLE

L94 ANSWER 1 OF 11 HCA COPYRIGHT 2010 ACS on STN

ACCESSION NUMBER: 145:86542 HCA Full-text

TITLE: Branched and sulfonated multi block copolymer
and electrolyte membrane using the
same

INVENTOR(S): Shin, Chong-Kyu; Tae, Young-Ji; Chang, Jae-Hyuk;
Lee, Bong-Keun; Cho, Chang-Ae; Lee, Sang-Hyun;
Yoo, Hwang-Chan; Moon, Go-Young

PATENT ASSIGNEE(S): Lg Chem, Ltd., S. Korea

SOURCE: U.S. Pat. Appl. Publ., 17 pp.
CODEN: USXXCO

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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US 20060134494	A1	20060622	US 2005-282488	200511 21
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US 7807759	B2	20101005		
KR 2006071690	A	20060627	KR 2004-110487	200412 22
			<--	
TW 294889	B	20080321	TW 2005-138560	200511 03
			<--	
CA 2549841	A1	20060622	CA 2005-2549841	200511 22
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CA 2549841	C	20100126		
WO 2006068369	A1	20060629	WO 2005-KR3939	200511 22
			<--	
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GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM,				
KN, KP, KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK,				
MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO,				
RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ,				
UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW				
RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU,				
IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR,				
BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD,				
TG, BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,				
ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
CN 1898293	A	20070117	CN 2005-80001135	200511 22
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CN 100556931	C	20091104		
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EP 1828278	A1	20070905	EP 2005-821386	200511 22
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TR				
IN 2006DN01527	A	20070810	IN 2006-DN1527	200603 22
			<--	
PRIORITY APPLN. INFO.:			KR 2004-110487	A 200412 22
			<--	

ASSIGNMENT HISTORY FOR US PATENT AVAILABLE IN LSUS DISPLAY FORMAT

AB The present invention relates to a branched and sulfonated multiblock copolymer and an electrolyte ~~membrane~~ produced therefrom. The copolymer has a high level of proton conductivity and excellent mech. properties, is chemical stable and can be readily used to produce a branched and sulfonated multiblock copolymer thin-film electrolyte ~~membrane~~ for use in a fuel cell. The copolymer can be effectively used for the production of a thin film without a decrease in ~~membrane~~ properties according to the increase in sulfonic acid groups since it enables the regulation of the distribution, the location and the number of sulfonic acid groups in the polymer backbone.

IT 893445-20-0P

(branched and sulfonated multiblock copolymer for electrolyte ~~membrane~~)

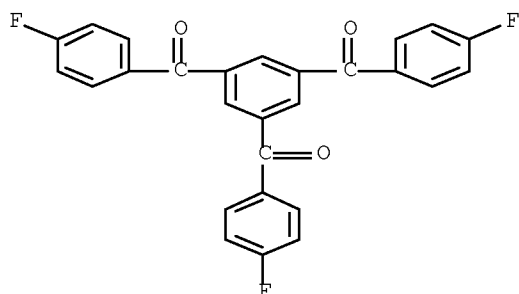
RN 893445-20-0 HCA

CN Benzenesulfonic acid, 2,5-dihydroxy-, potassium salt (1:1), polymer with 1,3,5-benzenetriyltris[(4-fluorophenyl)methanone], bis(4-fluorophenyl)methanone and 4,4'-(9H-fluoren-9-ylidene)bis[phenol], block (CA INDEX NAME)

CM 1

CRN 267668-44-0

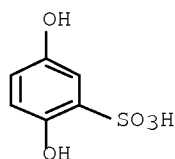
CMF C27 H15 F3 O3



CM 2

CRN 21799-87-1

CMF C6 H6 O5 S . K

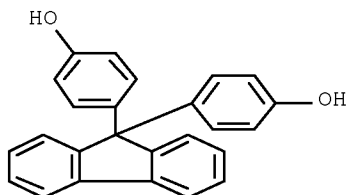


● K

CM 3

CRN 3236-71-3

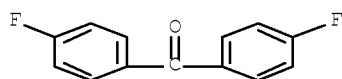
CMF C25 H18 O2



CM 4

CRN 345-92-6

CMF C13 H8 F2 O



INCL 429033000; 521025000

IPCI H01M0008-10 [I,A]; C08J0005-20 [I,A]; C08J0005-22 [I,A]; H01M0008-10 [I,A]; C08G0065-40 [I,A]; C08G0075-24 [I,A]; C08G0075-00 [I,C*]; C08G0065-38 [I,A]; C08G0065-00 [I,C*]; C08L0081-08 [I,A]; C08L0081-00 [I,C*]

IPCR H01M0008-10 [I,A]; C08J0005-20 [I,C]; C08J0005-20 [I,A]; H01M0008-10 [I,C]

NCL 429/494.000; 429/506.000; 429/535.000; 521/025.000

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

ST fuel cell electrolyte membrane
branched sulfonated multiblock copolymer

IT Fuel cell electrolytes
(branched and sulfonated multiblock copolymer for electrolyte membrane)

IT Polymers
(branched; branched and sulfonated multiblock copolymer for electrolyte membrane)

IT Fuel cells
(direct methanol; branched and sulfonated multiblock copolymer for electrolyte membrane)

IT Polyketones
(polyether-, cardo; branched and sulfonated multiblock copolymer for electrolyte membrane)

IT Cardo polymers
(polyether-polyketones; branched and sulfonated multiblock copolymer for electrolyte membrane)

IT Polyethers

(polyketone-, cardo; branched and sulfonated multiblock copolymer for electrolyte membrane)

IT 893445-20-0P

(branched and sulfonated multiblock copolymer for electrolyte membrane)

IT 67-56-1, Methanol, uses

(branched and sulfonated multiblock copolymer for electrolyte membrane)

IT 267668-44-0P 893445-19-7P

(branched and sulfonated multiblock copolymer for electrolyte membrane)

OS.CITING REF COUNT: 1 THERE ARE 1 CAPLUS RECORDS THAT CITE THIS RECORD (2 CITINGS)

L94 ANSWER 2 OF 11 HCA COPYRIGHT 2010 ACS on STN

ACCESSION NUMBER: 144:216069 HCA Full-text

TITLE: Sulfonated polymer-based electrolyte membranes with good water/methanol resistance and high proton conductivity

INVENTOR(S): Kawakami, Tomonori; Izuhara, Daisuke; Shimoyama, Naoki

PATENT ASSIGNEE(S): Toray Industries, Inc., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 23 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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JP 2006049303	A	20060216	JP 2005-195840	20050705

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PRIORITY APPLN. INFO.: JP 2004-197666 A

20040705

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AB The membranes, useful for polymer electrolyte fuel cells (PEFC), comprise sulfonated (hydrocarbon) polymers with volume d. of sulfonic acid groups in wet membranes (Sw) 1.45-6.0 mmol/cm³ (definition is described).

IT 116875-10-6DP, sulfonated

(sulfonated polymer-based electrolyte membranes with good water/methanol resistance and high proton conductivity for fuel cells)

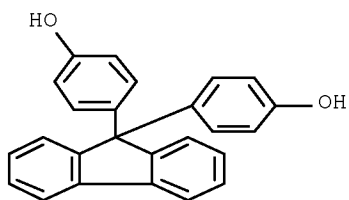
RN 116875-10-6 HCA

CN Methanone, bis(4-fluorophenyl)-, polymer with 1,4-benzenediol and 4,4'-(9H-fluoren-9-ylidene)bis[phenol] (9CI) (CA INDEX NAME)

CM 1

CRN 3236-71-3

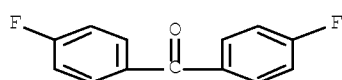
CMF C25 H18 O2



CM 2

CRN 345-92-6

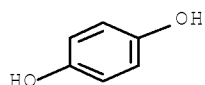
CMF C13 H8 F2 O



CM 3

CRN 123-31-9

CMF C6 H6 O2



IPCI H01M0008-02 [I,A]; C08J0005-22 [I,A]; C08J0005-20 [I,C*];
H01B0001-06 [I,A]; H01M0008-10 [I,A]

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

ST polyoxyphenylene sulfonic acid density fuel cell
electrolyte; sulfonated cardo fluoropolymer polyether polyketone
electrolyte; PEFC sulfonated electrolyte water methanol resistance

IT Polyketones
(polyether-, cardo, sulfonated; sulfonated polymer-based
electrolyte membranes with good water/methanol
resistance and high proton conductivity for fuel cells
)

IT Polyketones
(polyether-, fluorine-containing, cardo, sulfonated; sulfonated
polymer-based electrolyte membranes with good
water/methanol resistance and high proton conductivity for fuel
cells)

IT Polyketones
(polyether-, fluorine-containing, sulfo-containing; sulfonated
polymer-based electrolyte membranes with good
water/methanol resistance and high proton conductivity for fuel
cells)

- IT Polyketones
(polyether-, sulfo-containing; sulfonated polymer-based electrolyte membranes with good water/methanol resistance and high proton conductivity for fuel cells)
- IT Fluoropolymers, uses
(polyether-polyketone-, cardo, sulfonated; sulfonated polymer-based electrolyte membranes with good water/methanol resistance and high proton conductivity for fuel cells)
- IT Fluoropolymers, uses
(polyether-polyketone-, sulfo-containing; sulfonated polymer-based electrolyte membranes with good water/methanol resistance and high proton conductivity for fuel cells)
)
- IT Cardo polymers
(polyether-polyketones, fluorine-containing, sulfonated; sulfonated polymer-based electrolyte membranes with good water/methanol resistance and high proton conductivity for fuel cells)
- IT Cardo polymers
(polyether-polyketones, sulfonated; sulfonated polymer-based electrolyte membranes with good water/methanol resistance and high proton conductivity for fuel cells)
)
- IT Polyethers, uses
(polyketone-, cardo, sulfonated; sulfonated polymer-based electrolyte membranes with good water/methanol resistance and high proton conductivity for fuel cells)
)
- IT Polyethers, uses
(polyketone-, fluorine-containing, cardo, sulfonated; sulfonated polymer-based electrolyte membranes with good water/methanol resistance and high proton conductivity for fuel cells)
- IT Polyethers, uses
(polyketone-, fluorine-containing, sulfo-containing; sulfonated polymer-based electrolyte membranes with good water/methanol resistance and high proton conductivity for fuel cells)
- IT Polyethers, uses
(polyketone-, sulfo-containing; sulfonated polymer-based electrolyte membranes with good water/methanol resistance and high proton conductivity for fuel cells)
- IT Hydrocarbons, uses
(polymers, sulfonated; sulfonated polymer-based electrolyte membranes with good water/methanol resistance and high proton conductivity for fuel cells)
- IT Fuel cell electrolytes
(sulfonated polymer-based electrolyte membranes with good water/methanol resistance and high proton conductivity for fuel cells)
- IT Silsesquioxanes
(sulfonated polymer-based electrolyte membranes with good water/methanol resistance and high proton conductivity for fuel cells)
- IT Polyoxyphenylenes
(sulfonated; sulfonated polymer-based electrolyte membranes with good water/methanol resistance and high proton conductivity for fuel cells)
- IT 25134-01-4DP, sulfonated

(assumed monomers; sulfonated polymer-based electrolyte membranes with good water/methanol resistance and high proton conductivity for fuel cells)

IT 345-92-6, 4,4'-Difluorobenzophenone 2487-90-3, Trimethoxysilane 23523-56-0

(in preparation of monomers; sulfonated polymer-based electrolyte membranes with good water/methanol resistance and high proton conductivity for fuel cells)

IT 210531-45-6P 875647-25-9P

(monomers; sulfonated polymer-based electrolyte membranes with good water/methanol resistance and high proton conductivity for fuel cells)

IT 24938-67-8DP, YPX 100L, sulfonated 116875-10-6DP, sulfonated 862772-94-9P 862773-04-4P 875647-26-0P 875647-27-1P 875647-28-2P

(sulfonated polymer-based electrolyte membranes with good water/methanol resistance and high proton conductivity for fuel cells)

L94 ANSWER 3 OF 11 HCA COPYRIGHT 2010 ACS on STN

ACCESSION NUMBER: 144:111309 HCA Full-text

TITLE: Electrode catalyst layer, anode, and membrane-electrode assembly for polymer electrolyte fuel cell

INVENTOR(S): Kono, Satoshi; Kitai, Masayuki; Ito, Nobuaki

PATENT ASSIGNEE(S): Toray Industries, Inc., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 19 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2006012778	A	20060112	JP 2005-87880	20050325

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PRIORITY APPLN. INFO.: JP 2004-151454 A

20040521

<--

AB The catalyst- and polymer-containing layer for the cell using a liquid fuel, does not contain anionic group substantially. The ~~anode~~ is made of the above electrode catalyst layer. The assembly contain the layer and/or the ~~anode~~. A fuel cell using a liquid fuel and the above assembly is also claimed. A portable apparatus or a vehicle using the cell as a driving source is also claimed. The cell has high durability and energy d.

IT 116875-10-6DP, sulfonated

(cardo, catalyst layer containing; anionic group-free electrode catalyst layer for anode and membrane-electrode assembly in polymer electrolyte fuel cell for portable apparatus and vehicle)

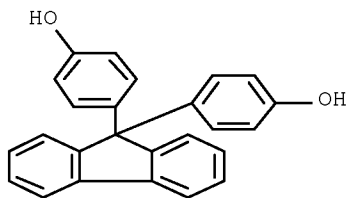
RN 116875-10-6 HCA

CN Methanone, bis(4-fluorophenyl)-, polymer with 1,4-benzenediol and 4,4'-(9H-fluoren-9-ylidene)bis[phenol] (9CI) (CA INDEX NAME)

CM 1

CRN 3236-71-3

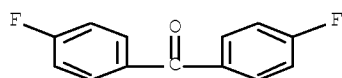
CMF C25 H18 O2



CM 2

CRN 345-92-6

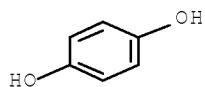
CMF C13 H8 F2 O



CM 3

CRN 123-31-9

CMF C6 H6 O2



IPCI H01M0004-86 [I,A]; H01M0008-00 [I,A]; H01M0008-10 [I,A]

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST anionic group free electrode catalyst layer anode
fuel cell; membrane electrode

assembly polymer electrolyte fuel cell; portable

app polymer electrolyte fuel cell

electrode catalyst layer; vehicle polymer electrolyte

fuel cell electrode catalyst layer

IT Catalysts

Electric vehicles

Fuel cell anodes

(anionic group-free electrode catalyst layer for
anode and membrane-electrode assemblyin polymer electrolyte fuel cell for portable
apparatus and vehicle)

IT Fluoropolymers, uses

(anionic group-free electrode catalyst layer for anode and membrane-electrode assembly in polymer electrolyte fuel cell for portable apparatus and vehicle)

- IT Polybenzimidazoles
 - Polycarbonates, uses
 - Polyimides, uses
 - Polyoxyphenylenes
 - Polysulfones, uses
 - Polythiophenylenes
 - (catalyst layer containing; anionic group-free electrode catalyst layer for anode and membrane-electrode assembly in polymer electrolyte fuel cell for portable apparatus and vehicle)
- IT Fluoropolymers, uses
 - (fluoroalkoxy group-containing, catalyst layer containing; anionic group-free electrode catalyst layer for anode and membrane-electrode assembly in polymer electrolyte fuel cell for portable apparatus and vehicle)
- IT Perfluoro compounds
 - Vinyl compounds, uses
 - (perfluoroalkyl vinyl ether polymers, catalyst layer containing; anionic group-free electrode catalyst layer for anode and membrane-electrode assembly in polymer electrolyte fuel cell for portable apparatus and vehicle)
- IT Ethers, uses
 - (perfluoroalkyl vinyl, polymers, catalyst layer containing; anionic group-free electrode catalyst layer for anode and membrane-electrode assembly in polymer electrolyte fuel cell for portable apparatus and vehicle)
- IT Polyketones
 - (polyether-, cardo, catalyst layer containing; anionic group-free electrode catalyst layer for anode and membrane-electrode assembly in polymer electrolyte fuel cell for portable apparatus and vehicle)
- IT Polyketones
 - (polyether-, cardo, sulfonated, catalyst layer containing; anionic group-free electrode catalyst layer for anode and membrane-electrode assembly in polymer electrolyte fuel cell for portable apparatus and vehicle)
- IT Polyketones
 - (polyether-, catalyst layer containing; anionic group-free electrode catalyst layer for anode and membrane-electrode assembly in polymer electrolyte fuel cell for portable apparatus and vehicle)
- IT Cardo polymers
 - (polyether-polyketones, catalyst layer containing; anionic group-free electrode catalyst layer for anode and membrane-electrode assembly in polymer electrolyte fuel cell for portable apparatus and vehicle)
- IT Cardo polymers
 - (polyether-polyketones, sulfonated, catalyst layer containing; anionic group-free electrode catalyst layer for

anode and membrane-electrode assembly
in polymer electrolyte fuel cell for portable
apparatus and vehicle)

- IT Polyethers, uses
(polyketone-, cardo, catalyst layer containing; anionic group-free
electrode catalyst layer for anode and
membrane-electrode assembly in polymer
electrolyte fuel cell for portable apparatus and
vehicle)
- IT Polyethers, uses
(polyketone-, cardo, sulfonated, catalyst layer containing; anionic
group-free electrode catalyst layer for anode
and membrane-electrode assembly in polymer
electrolyte fuel cell for portable apparatus and
vehicle)
- IT Polyethers, uses
(polyketone-, catalyst layer containing; anionic group-free
electrode catalyst layer for anode and
membrane-electrode assembly in polymer
electrolyte fuel cell for portable apparatus and
vehicle)
- IT Fuel cells
(polymer electrolyte; anionic group-free electrode
catalyst layer for anode and membrane-
electrode assembly in polymer electrolyte fuel
cell for portable apparatus and vehicle)
- IT Polythioethers
(polysulfone-, catalyst layer containing; anionic group-free
electrode catalyst layer for anode and
membrane-electrode assembly in polymer
electrolyte fuel cell for portable apparatus and
vehicle)
- IT Polysulfones, uses
(polythioether-, catalyst layer containing; anionic group-free
electrode catalyst layer for anode and
membrane-electrode assembly in polymer
electrolyte fuel cell for portable apparatus and
vehicle)
- IT Electric apparatus
(portable; anionic group-free electrode catalyst layer
for anode and membrane-electrode
assembly in polymer electrolyte fuel cell for
portable apparatus and vehicle)
- IT 12779-05-4
(anionic group-free electrode catalyst layer for
anode and membrane-electrode assembly
in polymer electrolyte fuel cell for portable
apparatus and vehicle)
- IT 116875-10-6DP, sulfonated
(cardo, catalyst layer containing; anionic group-free
electrode catalyst layer for anode and
membrane-electrode assembly in polymer
electrolyte fuel cell for portable apparatus and
vehicle)
- IT 116-14-3D, Tetrafluoroethylene, polymers with perfluoroalkyl ethers
9002-84-0, Polytetrafluoroethylene 24937-79-9, Poly(vinylidene
fluoride) 25120-07-4, Polyhexafluoropropylene 27028-97-3D,
Poly(phenylene sulfide sulfone), sulfonated
(catalyst layer containing; anionic group-free electrode
catalyst layer for anode and membrane-

electrode assembly in polymer electrolyte fuel
cell for portable apparatus and vehicle)

L94 ANSWER 4 OF 11 HCA COPYRIGHT 2010 ACS on STN
ACCESSION NUMBER: 143:389781 HCA Full-text
TITLE: Solid polymer electrolyte membranes
with low methanol permeability and high protonic
conductivity
INVENTOR(S): Sakai, Nobuyuki
PATENT ASSIGNEE(S): Sumitomo Bakelite Co., Ltd., Japan
SOURCE: Jpn. Kokai Tokkyo Koho, 10 pp.
CODEN: JKXXAF
DOCUMENT TYPE: Patent
LANGUAGE: Japanese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

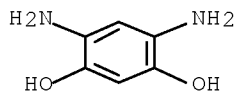
PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2005285449	A	20051013	JP 2004-95586	200403 29

PRIORITY APPLN. INFO.: <--
JP 2004-95586
200403
29

AB The electrolyte membranes, useful for fuel cells, are composed of polymers
having ≥ 10 mol% mesogen- and ion-dissociative group-containing repeating
units. The electrolyte membranes show low methanol permeability and high
protonic conductivity
IT 866556-22-1DP, sulfonated
(solid polymer electrolyte membranes composed of
polymers having mesogen- and ion-dissociative group-containing
repeating units)
RN 866556-22-1 HCA
CN 2,6-Naphthalenedicarbonyl dichloride, polymer with
4,6-diamino-1,3-benzenediol dihydrochloride (9CI) (CA INDEX NAME)

CM 1

CRN 16523-31-2
CMF C6 H8 N2 O2 . 2 Cl H

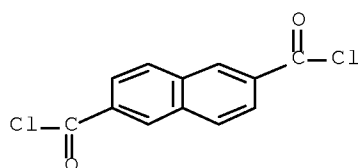


● 2 HCl

CM 2

CRN 2351-36-2

CMF C12 H6 C12 O2



IPCI H01M0008-02 [ICM,7]; H01B0001-06 [ICS,7]; H01M0008-10 [ICS,7]
 IPCR H01B0001-06 [I,A]; H01B0001-06 [I,C*]; H01M0008-02 [I,A];
 H01M0008-02 [I,C*]; H01M0008-10 [I,A]; H01M0008-10 [I,C*]
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 Section cross-reference(s): 38, 76
 ST solid polymer electrolyte ~~membrane~~ mesogen fuel
 cell; norbornene phenylstyrene polymer sulfonated
 electrolyte
 IT Ionic conductors
 (protonic; solid polymer electrolyte ~~membranes~~ composed
 of polymers having mesogen- and ion-dissociative group-containing
 repeating units)
 IT Fuel cell electrolytes
 Polyelectrolytes
 Solid electrolytes
 (solid polymer electrolyte ~~membranes~~ composed of
 polymers having mesogen- and ion-dissociative group-containing
 repeating units)
 IT Polyolefins
 (solid polymer electrolyte ~~membranes~~ composed of
 polymers having mesogen- and ion-dissociative group-containing
 repeating units)
 IT Phenolic resins, uses
 Polyimides, uses
 (solid polymer electrolyte ~~membranes~~ composed of
 polymers having mesogen- and ion-dissociative group-containing
 repeating units)
 IT Epoxy resins, uses
 Polybenzoxazoles
 (sulfonated; solid polymer electrolyte ~~membranes~~
 composed of polymers having mesogen- and ion-dissociative
 group-containing repeating units)
 IT 209905-88-4DP, sulfonated 866556-21-0DP, sulfonated
~~866556-22-1DP, sulfonated~~ 866556-23-2DP,
 sulfonated
 (solid polymer electrolyte ~~membranes~~ composed of
 polymers having mesogen- and ion-dissociative group-containing
 repeating units)

L94 ANSWER 5 OF 11 HCA COPYRIGHT 2010 ACS on STN
 ACCESSION NUMBER: 143:62658 HCA Full-text
 TITLE: Polymer electrolyte ~~membrane~~
 INVENTOR(S): Kawakami, Tomonori; Izuhara, Daisuke; Shimoyama,
 Naoki
 PATENT ASSIGNEE(S): Toray Industries, Inc., Japan
 SOURCE: Jpn. Kokai Tokkyo Koho, 17 pp.
 CODEN: JKXXAF

October 25, 2010

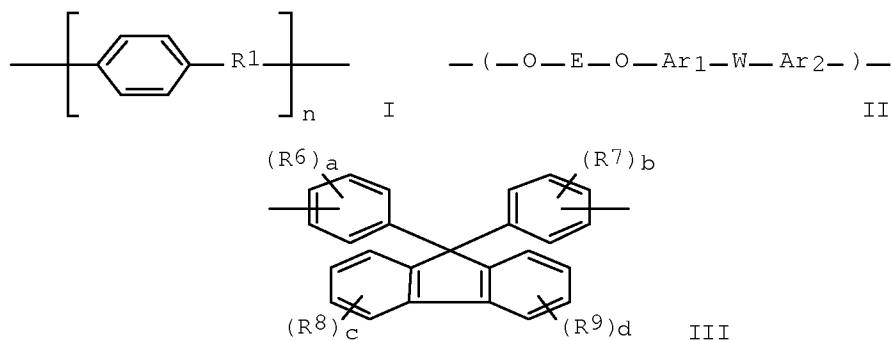
10/551,576

88

DOCUMENT TYPE: Patent
 LANGUAGE: Japanese
 FAMILY ACC. NUM. COUNT: 1
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2005158724	A	20050616	JP 2004-320703	20041104
			<--	
PRIORITY APPLN. INFO.:		JP 2003-375211	A	20031105
			<--	

GI



AB The electrolyte membrane, for use in a fuel cell, is a sulfonated polymer containing 3.29-3.75 mmol sulfonic acid group/cm³ and a solubility parameter 9.00-12.18. Preferably, the polymer has repeating units I [1 = single bond, -O-, -S-, -CH₂-, -CF₂-, or -C(CF₃)₂-; R₂-5 = H, sulfonic acid group, ME, Et, Ph, Cyclohexyl, or fluoroalkyl group and contains ≥1 sulfonic acid group] or II [E = bivalent sulfonic acid group containing aromatic ring, Ar₁ and Ar₂ = (substituted) bivalent Arylene groups, W = -CO-, -SO₂-, -P(R)O- (R = organic group); and II contains ≥2 of E, A₁, A₂, and/or W]. E is preferably III, where the dotted line may be a single bond or may not exist, and R₆-9 = halogen, single valent organic group, or sulfonic acid group and contains ≥1 sulfonic acid group, a and b = 0-4, c and d = 0-5.

IT 116875-10-6DP, sulfonated
 (in manufacture of sulfonated polymer electrolyte membranes for fuel cells)

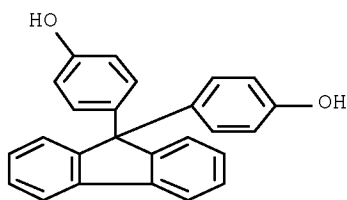
RN 116875-10-6 HCA

CN Methanone, bis(4-fluorophenyl)-, polymer with 1,4-benzenediol and 4,4'-(9H-fluoren-9-ylidene)bis[phenol] (9CI) (CA INDEX NAME)

CM 1

CRN 3236-71-3

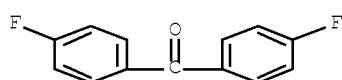
CMF C25 H18 O2



CM 2

CRN 345-92-6

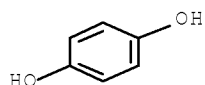
CMF C13 H8 F2 O



CM 3

CRN 123-31-9

CMF C6 H6 O2



IPCI H01M0008-02 [ICM,7]; C08J0005-22 [ICS,7]; C08J0005-20 [ICS,7,C*];
 H01B0001-06 [ICS,7]; H01M0008-10 [ICS,7]; C08L0101-00 [ICS,7]
 IPCR C08J0005-20 [I,C*]; C08J0005-22 [I,A]; H01B0001-06 [I,A];
 H01B0001-06 [I,C*]; H01M0008-02 [I,A]; H01M0008-02 [I,C*];
 H01M0008-10 [I,A]; H01M0008-10 [I,C*]
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 ST fuel cell sulfonated polymer electrolyte
 structure
 IT Fuel cell electrolytes
 (structure and manufacture of sulfonated polymer electrolyte
 membranes for fuel cells)
 IT 116875-10-6DP, sulfonated 210531-45-6P
 (in manufacture of sulfonated polymer electrolyte
 membranes for fuel cells)
 IT 9041-80-9DP, Poly(phenylene oxide), sulfonated 854669-40-2DP,
 sulfonated 854669-46-8DP, sulfonated
 (structure and manufacture of sulfonated polymer electrolyte
 membranes for fuel cells)
 OS.CITING REF COUNT: 2 THERE ARE 2 CAPLUS RECORDS THAT CITE THIS
 RECORD (2 CITINGS)

October 25, 2010

10/551,576

90

ACCESSION NUMBER: 142:412637 HCA Full-text
 TITLE: Block copolymer and use for polymeric
 electrolyte of fuel cell
 INVENTOR(S): Onodera, Toru; Sasaki, Shigeru; Yashiki,
 Daizaburo
 PATENT ASSIGNEE(S): Sumitomo Chemical Company, Limited, Japan
 SOURCE: PCT Int. Appl., 36 pp.
 CODEN: PIXXD2
 DOCUMENT TYPE: Patent
 LANGUAGE: Japanese
 FAMILY ACC. NUM. COUNT: 1
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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WO 2005037892	A1	20050428	WO 2004-JP15666	200410 15
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W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW RW: BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
JP 2005139432	A	20050602	JP 2004-264988	200409 13
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JP 4424129	B2	20100303		
CA 2542687	A1	20050428	CA 2004-2542687	200410 15
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EP 1674498	A1	20060628	EP 2004-792808	200410 15
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CN 1867615	A	20061122	CN 2004-80030191	200410 15
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US 20070066759	A1	20070322	US 2006-575949	200604 13
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US 7803884	B2	20100928		
KR 2006115381	A	20061108	KR 2006-7008715	200605 04
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PRIORITY APPLN. INFO.:

JP 2003-357441

A

200310

17

<--

WO 2004-JP15666

W

200410

15

<--

ASSIGNMENT HISTORY FOR US PATENT AVAILABLE IN LSUS DISPLAY FORMAT

AB A block copolymer including one or more segments having an acid radical and one or more another segments practically having no acid radical is disclosed, wherein the segment practically having no acid radical includes a repeating structure Ar1ZAr2O Ar3O (wherein m is an integer not less than 10; Ar1, Ar2, and Ar3 independently represent a divalent aromatic group which may be substituted by an alkyl group having 1-10 carbon atoms, an alkoxy group having 1-10 carbon atoms, an aryl group having 6-10 carbon atoms, or an aryloxy group having 6-10 carbon atoms; Z represents CO or SO₂ and each Z in the resp. segments independently represents CO or SO₂). The block copolymer exhibits excellent performance as a polymer electrolyte for fuel cells or the like. Reacting 2,6-dihydroxynaphthalene with 4,4'-difluorodiphenylsulfone and treating with hydroquinonesulfonic acid K salt and 4,4'-difluorodiphenylsulfone-3,3'-disulfonic acid dipotassium salt gave a block copolymer with number mol. weight 5.2×10^4 . Bar coating an NMP solution of this copolymer on a porous polyethylene membrane, drying at 80°, and soaking in aqueous HCl gave an electrolyte composite membrane with proton conductivity 1.16×10^{-1} S/cm.

IT ~~850537-55-2P~~ 850537-56-3P,
2,6-Dihydroxynaphthalene-4,4'-difluorodiphenylsulfone-
hydroquinonesulfonic acid potassium
salt-4,4'-difluorodiphenylsulfone-3,3'-disulfonic acid dipotassium
salt block copolymer
(polyether polysulfone block copolymer and use for polymeric
electrolyte of fuel cell)

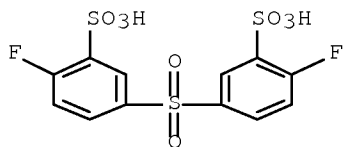
RN 850537-55-2 HCA

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-fluoro-, dipotassium salt,
polymer with [1,1'-biphenyl]-4,4'-diol, 2,5-dihydroxybenzenesulfonic
acid monopotassium salt, 2,2',3,3',5,5',6,6'-octafluoro[1,1'-
biphenyl]-4,4'-diol and 1,1'-sulfonylbis[4-fluorobenzene], block
(9CI) (CA INDEX NAME)

CM 1

CRN 816417-98-8

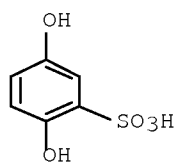
CMF C12 H8 F2 O8 S3 . 2 K



● 2 K

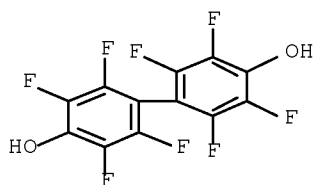
CM 2

CRN 21799-87-1
CMF C6 H6 O5 S . K



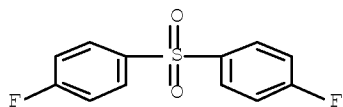
CM 3

CRN 2200-70-6
CMF C12 H2 F8 O2



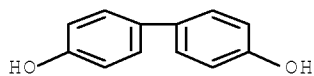
CM 4

CRN 383-29-9
CMF C12 H8 F2 O2 S



CM 5

CRN 92-88-6
CMF C12 H10 O2



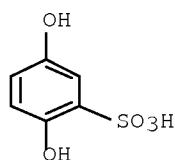
RN 850537-56-3 HCA

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-fluoro-, dipotassium salt,
homopolymer, polymer with 2,6-naphthalenediol, potassium
2,5-dihydroxybenzenesulfonate and 1,1'-sulfonylbis[4-fluorobenzene],
block (9CI) (CA INDEX NAME)

CM 1

CRN 21799-87-1

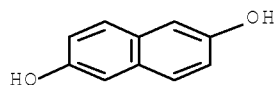
CMF C6 H6 O5 S . K



CM 2

CRN 581-43-1

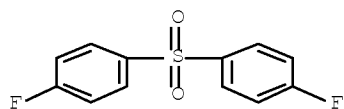
CMF C10 H8 O2



CM 3

CRN 383-29-9

CMF C12 H8 F2 O2 S



CM 4

CRN 850537-54-1

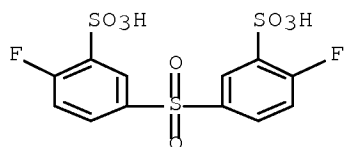
CMF (C12 H8 F2 O8 S3 . 2 K)x

CCI PMS

CM 5

CRN 816417-98-8

CMF C12 H8 F2 O8 S3 . 2 K



● 2 K

- IPCI C08G0081-00 [ICM, 7]; H01B0001-12 [ICS, 7]; H01M0008-02 [ICS, 7];
H01M0008-10 [ICS, 7]
- IPCR C08G0065-00 [I, C*]; C08G0065-40 [I, A]; C08G0065-48 [I, A];
C08G0075-00 [I, C*]; C08G0075-23 [I, A]; H01B0001-12 [I, C*];
H01B0001-12 [I, A]; H01M0008-10 [I, C*]; H01M0008-10 [I, A]
- CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 35, 52
- ST polyether polysulfone block copolymer polyelectrolyte fuel
cell; dihydroxynaphthalene difluorodiphenylsulfone
hydroquinonesulfonic difluorodiphenylsulfonedisulfonic acid block
copolymer
- IT Catalysts
Fuel cell separators
Polyelectrolytes
(polyether polysulfone block copolymer and use for polymeric
electrolyte of fuel cell)
- IT Polysulfones, uses
(polyether-, fluorine-containing; polyether polysulfone block
copolymer and use for polymeric electrolyte of fuel
cell)
- IT Polysulfones, uses
(polyether-; polyether polysulfone block copolymer and use for
polymeric electrolyte of fuel cell)
- IT Fluoropolymers, uses
(polyether-polysulfone-; polyether polysulfone block copolymer
and use for polymeric electrolyte of fuel cell
)
- IT Polyethers, uses
(polysulfone-, fluorine-containing; polyether polysulfone block
copolymer and use for polymeric electrolyte of fuel
cell)
- IT Polyethers, uses
(polysulfone-; polyether polysulfone block copolymer and use for
polymeric electrolyte of fuel cell)
- IT 850537-55-2P 850537-56-3P,
2,6-Dihydroxynaphthalene-4,4'-difluorodiphenylsulfone-
hydroquinonesulfonic acid potassium
salt-4,4'-difluorodiphenylsulfone-3,3'-disulfonic acid dipotassium
salt block copolymer
(polyether polysulfone block copolymer and use for polymeric
electrolyte of fuel cell)
- IT 9002-88-4, Polyethylene
(polyether polysulfone block copolymer and use for polymeric

electrolyte of fuel cell)

RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	File
Asahi Glass Engineering	2003			JP 2003155361 A	HCA
Hossein, G	2003	44	814	Polymer Preprints	
Sumitomo Chemical Co Lt	2003			EP 1274147 A2	HCA
Sumitomo Chemical Co Lt	2003			CN 1394889 A	HCA
Sumitomo Chemical Co Lt	2003			US 20030044669 A1	
Sumitomo Chemical Co Lt	2003			JP 200317090 A	
Sumitomo Chemical Co Lt	2003			KR 20034097 A	
Sumitomo Chemical Co Lt	2003			JP 200341031 A	
Sumitomo Chemical Co Lt	2003			CA 2392241 A1	HCA
Tosoh Corp	2004			JP 2004263052 A	HCA
Ube Industries Ltd	2002			WO 0291507 A1	
Ube Industries Ltd	2002			EP 1394879 A1	HCA
Ube Industries Ltd	2002			JP 200331232 A2	
Ube Industries Ltd	2002			US 20040101730 A1	HCA

OS.CITING REF COUNT: 7 THERE ARE 7 CAPLUS RECORDS THAT CITE THIS RECORD (22 CITINGS)

L94 ANSWER 7 OF 11 HCA COPYRIGHT 2010 ACS on STN

ACCESSION NUMBER: 142:41470 HCA Full-text

TITLE: Polymer electrolyte membranes, membrane electrodes, and fuel cells

INVENTOR(S): Nakamura, Masataka; Adachi, Masaya; Izuhara, Daisuke; Ito, Nobuaki

PATENT ASSIGNEE(S): Toray Industries, Inc., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 30 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2004342610	A	20041202	JP 2004-127903	20040423
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PRIORITY APPLN. INFO.:			JP 2003-120114	A 20030424
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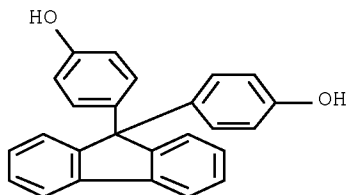
AB The disclosed polymer electrolyte is characterized in that the proton conductivity of the electrolyte measured immediately after taken out of an aqueous methanol solution does not increase even if the concentration of the methanol in the aqueous solution is increased. Preferably, the permeability of the methanol in the electrolyte membrane increases with increase of the methanol concentration. Membrane electrode assembly and direct methanol fuel cells prepared by using the electrolyte membranes are also disclosed.

IT 116875-10-6DP, sulfonated
(polymer electrolyte for direct methanol fuel cells)

RN 116875-10-6 HCA
 CN Methanone, bis(4-fluorophenyl)-, polymer with 1,4-benzenediol and
 4,4'-(9H-fluoren-9-ylidene)bis[phenol] (9CI) (CA INDEX NAME)

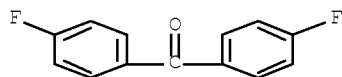
CM 1

CRN 3236-71-3
 CMF C25 H18 O2



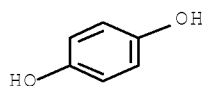
CM 2

CRN 345-92-6
 CMF C13 H8 F2 O



CM 3

CRN 123-31-9
 CMF C6 H6 O2



IPCI H01M0008-02 [ICM,7]; H01B0001-06 [ICS,7]; H01M0008-10 [ICS,7];
 C08G0065-34 [ICS,7]; C08G0065-00 [ICS,7,C*]
 IPCR C08G0065-00 [N,C*]; C08G0065-34 [N,A]; H01B0001-06 [I,A];
 H01B0001-06 [I,C*]; H01M0008-02 [I,A]; H01M0008-02 [I,C*];
 H01M0008-10 [I,A]; H01M0008-10 [I,C*]
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 Section cross-reference(s): 35
 ST polymer electrolyte ~~membrane~~ direct methanol fuel
 cell
 IT Fuel cell electrolytes
 (polymer; polymer electrolytes for direct methanol fuel
 cells)
 IT 116875-10-6DP, sulfonated 216689-01-9DP,

sulfonated
(polymer electrolyte for direct methanol fuel
cells)

L94 ANSWER 8 OF 11 HCA COPYRIGHT 2010 ACS on STN
ACCESSION NUMBER: 141:317249 HCA Full-text
TITLE: Solid polymer electrolyte and proton conducting
membrane
INVENTOR(S): Kanaoka, Nagayuki; Iguchi, Masaru; Mitsuta,
Naoki; Sohma, Hiroshi; Ohtsuki, Toshihiro
PATENT ASSIGNEE(S): Honda Motor Co., Ltd., Japan; JSR Corporation
SOURCE: Eur. Pat. Appl., 32 pp.
CODEN: EPXXDW
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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EP 1465277	A1	20041006	EP 2004-6601	200403 18
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JP 2004285116	A	20041014	JP 2003-76192	200303 19
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JP 2003-76194 A 200303
19

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JP 2003-81768 A 200303
25

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AB The invention aims to provide a sulfonic acid group-containing polymer having improved hot water resistance and radical resistance (durability), a solid polymer electrolyte including the polymer, and a proton-conducting membrane including the electrolyte, the polymer electrolyte includes a sulfonated product of a polymer shown by the following general formula [X]_a[Y]_b[Z]_c wherein X, Y, and Z are bonded randomly, alternately, or in blocks, b represents an integer of two or more, and each of a and c represents an integer of zero or more, where a + c > 2.

IT 768370-50-9DP, sulfonated 768370-51-0DP, sulfonated 768370-53-2DP, sulfonated 768370-54-3DP, sulfonated 768370-56-5DP, sulfonated 768370-58-7DP, sulfonated 768370-59-8DP, sulfonated 768394-50-9DP, sulfonated 768394-52-1DP, sulfonated 768394-54-3DP, sulfonated 768394-56-5DP, sulfonated
(solid polymer electrolyte and proton conducting membrane)

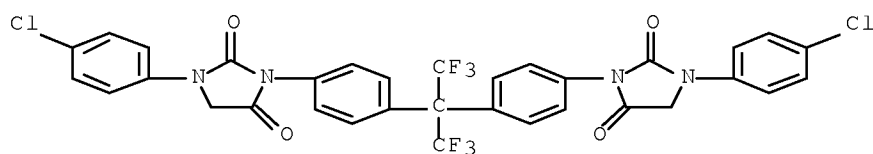
RN 768370-50-9 HCA

CN 2,4-Imidazolidinedione, 3,3'-[[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]di-4,1-phenylene]bis[1-(4-chlorophenyl)-, polymer with (2,5-dichlorophenyl)[4-(4-phenoxyphenoxy)phenyl]methanone (9CI) (CA INDEX NAME)

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CRN 768370-49-6

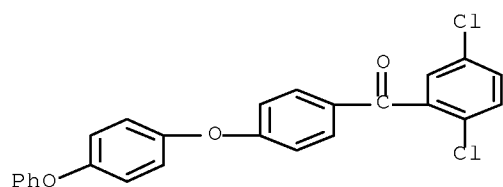
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CM 2

CRN 463954-50-9

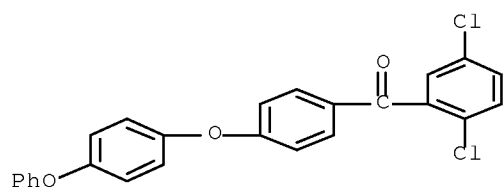
CMF C25 H16 C12 O3



RN 768370-51-0 HCA
 CN Imidazolidinetrione, bis(4-chlorophenyl)-, polymer with
 (2,5-dichlorophenyl) [4-(4-phenoxyphenoxy)phenyl]methanone (9CI) (CA
 INDEX NAME)

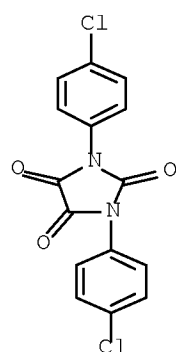
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CRN 463954-50-9
 CMF C25 H16 Cl2 O3



CM 2

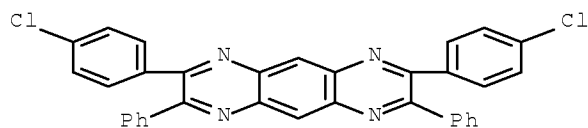
CRN 81657-50-3
 CMF C15 H8 Cl2 N2 O3



RN 768370-53-2 HCA
 CN Methanone, (2,5-dichlorophenyl) [4-(4-phenoxyphenoxy)phenyl]-,
 polymer with 3,7-bis(4-chlorophenyl)-2,8-diphenylpyrazino[2,3-
 g]quinoxaline (9CI) (CA INDEX NAME)

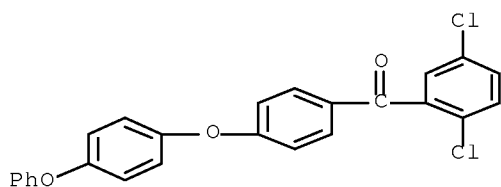
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CRN 768370-52-1
CMF C34 H20 C12 N4



CM 2

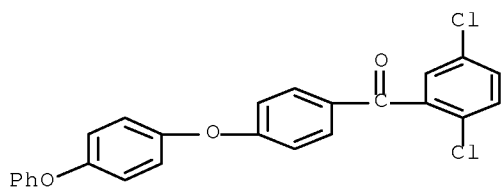
CRN 463954-50-9
CMF C25 H16 C12 O3



RN 768370-54-3 HCA
CN Methanone, bis(4-chlorophenyl)-, polymer with
2,5-bis(4-chlorophenyl)-1,3,4-oxadiazole,
(2,5-dichlorophenyl)[4-(4-phenoxyphenoxy)phenyl]methanone and
4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol],
block (9CI) (CA INDEX NAME)

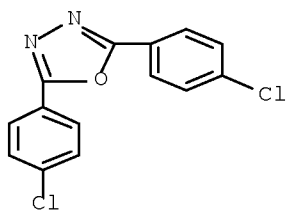
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CRN 463954-50-9
CMF C25 H16 C12 O3



CM 2

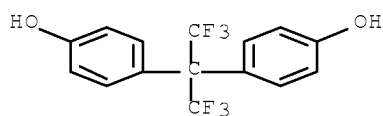
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CMF C14 H8 C12 N2 O



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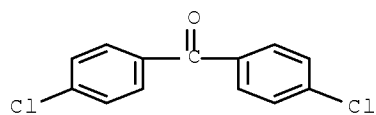
CMF C15 H10 F6 O2



CM 4

CRN 90-98-2

CMF C13 H8 Cl2 O



RN 768370-56-5 HCA

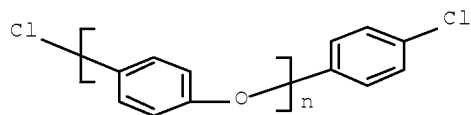
CN Methanone, (2,5-dichlorophenyl)[4-(4-phenoxyphenoxy)phenyl]-,
polymer with α -(4-chlorophenyl)- ω -chloropoly(oxy-1,4-
phenylene) (9CI) (CA INDEX NAME)

CM 1

CRN 768370-55-4

CMF (C6 H4 O)_n C6 H4 Cl2

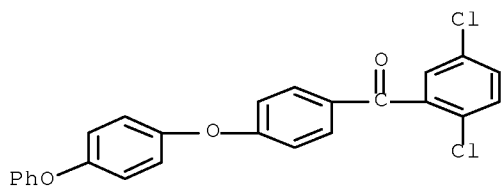
CCI PMS



CM 2

CRN 463954-50-9

CMF C25 H16 Cl2 O3



RN 768370-58-7 HCA

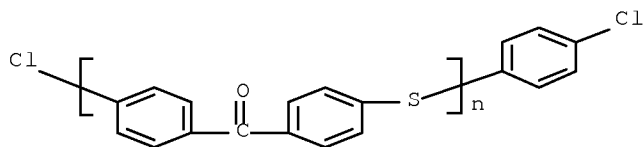
CN Methanone, (2,5-dichlorophenyl)[4-(4-phenoxyphenoxy)phenyl]-, polymer with α -(4-chlorophenyl)- ω -chloropoly(thio-1,4-phenylenecarbonyl-1,4-phenylene) (9CI) (CA INDEX NAME)

CM 1

CRN 768370-57-6

CMF (C13 H8 O S)_n C6 H4 Cl2

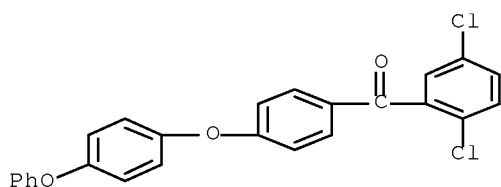
CCI PMS



CM 2

CRN 463954-50-9

CMF C25 H16 Cl2 O3



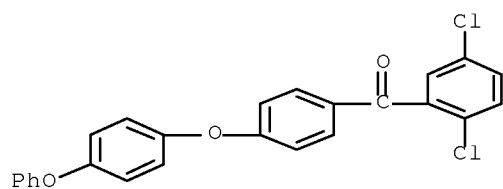
RN 768370-59-8 HCA

CN Methanone, bis(4-chlorophenyl)-, polymer with α -(4-chlorophenyl)- ω -chloropoly(thio-1,4-phenylene), (2,5-dichlorophenyl)[4-(4-phenoxyphenoxy)phenyl]methanone and 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol], block (9CI) (CA INDEX NAME)

CM 1

CRN 463954-50-9

CMF C25 H16 Cl2 O3

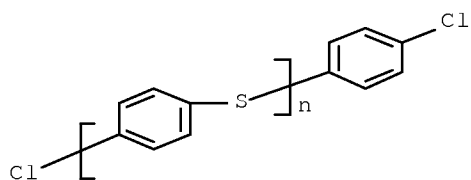


CM 2

CRN 99821-92-8

CMF (C6 H4 S)_n C6 H4 Cl2

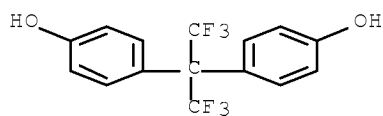
CCI PMS



CM 3

CRN 1478-61-1

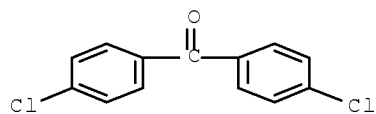
CMF C15 H10 F6 O2



CM 4

CRN 90-98-2

CMF C13 H8 Cl2 O



RN 768394-50-9 HCA
CN 1H-Isoindole-1,3(2H)-dione, ar,ar'-oxybis[2-(chlorophenyl)-, polymer
with (2,5-dichlorophenyl)[4-(4-phenoxyphenoxy)phenyl]methanone (9CI)
(CA INDEX NAME)

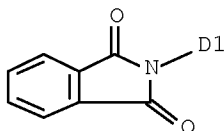
CM 1

CRN 768394-49-6
CMF C28 H14 C12 N2 O5
CCI IDS



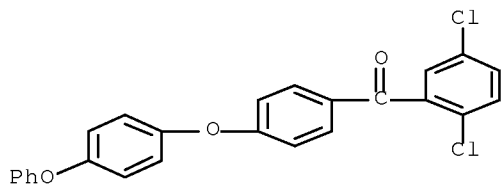
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D1—C1



CM 2

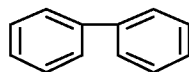
CRN 463954-50-9
CMF C25 H16 C12 O3



RN 768394-52-1 HCA
CN Methanone, (2,5-dichlorophenyl)[4-(4-phenoxyphenoxy)phenyl]-,
polymer with ar,ar'-oxybis[2-(ar'-chloro[1,1'-biphenyl]-ar-yl)-2,3-
dihydro-1H-benzotriazole] (9CI) (CA INDEX NAME)

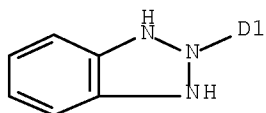
CM 1

CRN 768394-51-0
CMF C36 H26 C12 N6 O
CCI IDS



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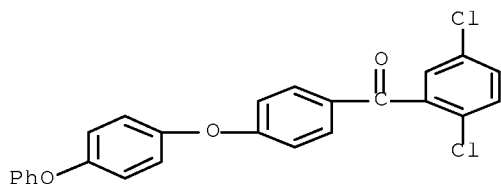
D1—C1



CM 2

CRN 463954-50-9

CMF C25 H16 C12 O3



RN 768394-54-3 HCA

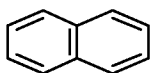
CN Methanone, (2,5-dichlorophenyl)[4-(4-phenoxyphenoxy)phenyl]-,
polymer with ar,ar'-oxybis[2-(chloronaphthalenyl)-2,3-dihydro-1,2,3-
benzothiadiazole] (9CI) (CA INDEX NAME)

CM 1

CRN 768394-53-2

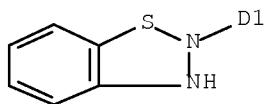
CMF C32 H20 C12 N4 O S2

CCI IDS



1/2 (D1—O—D1)

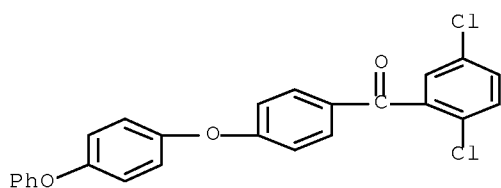
D1—C1



CM 2

CRN 463954-50-9

CMF C25 H16 C12 O3



RN 768394-56-5 HCA

CN Methanone, bis(4-chlorophenyl)-, polymer with
(2,5-dichlorophenyl) [4-(4-phenoxyphenoxy)phenyl]methanone,
ar,ar'-oxybis[2-(chlorophenyl)-2,3-dihydro-1,2,3-benzoxadiazole] and
4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol],
block (9CI) (CA INDEX NAME)

CM 1

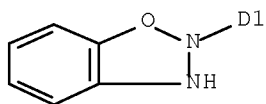
CRN 768394-55-4

CMF C24 H16 C12 N4 O3

CCI IDS

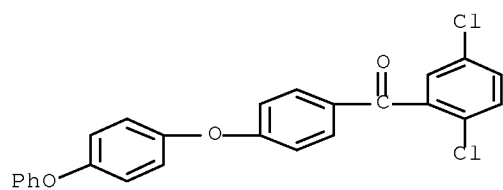


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$$D1-C1$$


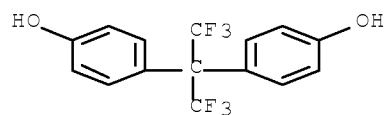
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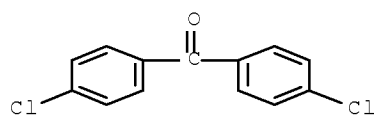
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$$CMF \quad C15 \ H10 \ F6 \ O2$$


$$CM \quad 4$$

$$CRN \quad 90-98-2$$

$$CMF \quad C13 \ H8 \ C12 \ O$$


IPCI H01M0008-10 [ICM,7]; H01M0010-40 [ICS,7]; H01M0010-36 [ICS,7,C*]
 IPCR C08J0005-20 [I,C*]; C08J0005-22 [I,A]; H01M0004-90 [N,C*];
 H01M0004-92 [N,A]; H01M0008-02 [I,C*]; H01M0008-02 [I,A];
 H01M0008-10 [I,C*]; H01M0008-10 [I,A]; H01M0010-36 [I,C*];
 H01M0010-40 [I,A]
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 Section cross-reference(s): 38, 72, 76
 ST proton conducting membrane fuel cell
 IT Fuel cells
 (proton exchange membrane; solid polymer electrolyte
 and proton conducting membrane)
 IT Electrolytic cells
 Gas sensors
 Hygrometers
 Membranes, nonbiological
 Solid electrolytes
 (solid polymer electrolyte and proton conducting membrane
)
 IT Polymers, uses
 (sulfonated; solid polymer electrolyte and proton conducting
 membrane)
 IT 768370-50-9DP, sulfonated 768370-51-0DP,
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 768394-54-3DP, sulfonated 768394-56-5DP,
 sulfonated 768394-57-6DP, sulfonated
 (solid polymer electrolyte and proton conducting membrane
)

RETABLE

Referenced Author	Year	VOL	PG	Referenced Work	
(RAU)	(RPY)	(RVL)	(RPG)	(RWK)	File
=====	+	=====	+	=====	+
==					
Anon				WO 0238650 A1	HCA
Anon				EP 1138712 A2	HCA
Anon				EP 1274147 A2	HCA
Anon				WO 9424717 A1	HCA
OS.CITING REF COUNT:	1			THERE ARE 1 CAPLUS RECORDS THAT CITE THIS	
				RECORD (1 CITINGS)	

L94 ANSWER 9 OF 11 HCA COPYRIGHT 2010 ACS on STN
 ACCESSION NUMBER: 141:280351 HCA Full-text
 TITLE: Polymer electrolyte material, polymer
 electrolyte parts, membrane-
 electrode laminate, and polymer
 electrolyte fuel cell
 INVENTOR(S): Adachi, Shinya; Izuhara, Daisuke; Nakamura,
 Masataka; Ito, Nobuaki
 PATENT ASSIGNEE(S): Toray Industries, Inc., Japan
 SOURCE: PCT Int. Appl., 147 pp.
 CODEN: PIXXD2
 DOCUMENT TYPE: Patent

October 25, 2010

10/551,576

109

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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WO 2004079844	A1	20040916	WO 2004-JP2894	20040305
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JP 2003-386734 A 200311
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WO 2004-JP2894 W 200403
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ASSIGNMENT HISTORY FOR US PATENT AVAILABLE IN LSUS DISPLAY FORMAT

AB The electrolyte material has a nonfreezing water fraction (Rw1) of 20-100 in a hydrous state {Rw1 = [Wnf/(Wfc + Wnf)]; Wnf= amount of nonfreezing water per g of dry weight of polymer electrolyte material; and Wfc= amount of low m.p. water per g of dry weight of polymer electrolyte material}. The parts, the laminate, and the fuel cell use the above material. The fuel cell, using the above material, has excellent proton-conductivity and fuel cutoff properties and improved efficiency.

IT 116875-10-6D, sulfonated 116875-11-7D, sulfonated 125658-29-9D, sulfonated 132109-45-6D, sulfonated 132139-83-4D, sulfonated 136691-69-5D, sulfonated 146027-07-8D, sulfonated 146088-68-8D, sulfonated 199610-91-8D, sulfonated 758706-30-8D, sulfonated 758706-31-9D, sulfonated 758706-34-2D, sulfonated 758706-35-3D, sulfonated
(fuel cells containing polymer electrolyte materials with controlled nonfreezing water fraction for improved efficiency)

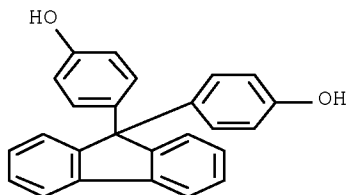
RN 116875-10-6 HCA

CN Methanone, bis(4-fluorophenyl)-, polymer with 1,4-benzenediol and 4,4'-(9H-fluoren-9-ylidene)bis[phenol] (9CI) (CA INDEX NAME)

CM 1

CRN 3236-71-3

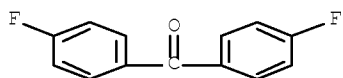
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CM 2

CRN 345-92-6

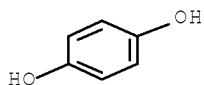
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CM 3

CRN 123-31-9

CMF C6 H6 O2



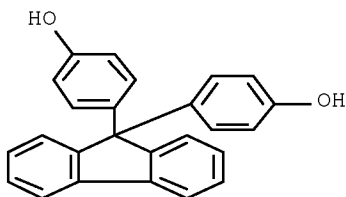
RN 116875-11-7 HCA

CN 1,4-Benzenediol, polymer with 4,4'-(9H-fluoren-9-ylidene)bis[phenol]
and 1,1'-sulfonylbis[4-fluorobenzene] (9CI) (CA INDEX NAME)

CM 1

CRN 3236-71-3

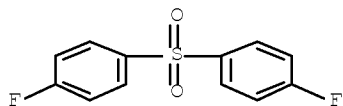
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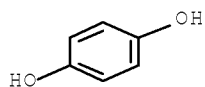
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CM 3

CRN 123-31-9

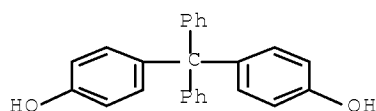
CMF C6 H6 O2



RN 125658-29-9 HCA
CN Methanone, bis(4-fluorophenyl)-, polymer with 1,4-benzenediol and
4,4'-(diphenylmethylene)bis[phenol] (9CI) (CA INDEX NAME)

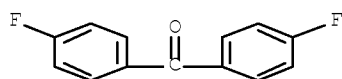
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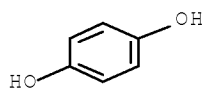
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CRN 345-92-6
CMF C13 H8 F2 O



CM 3

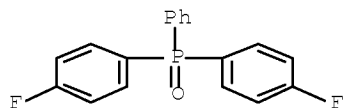
CRN 123-31-9
CMF C6 H6 O2



RN 132109-45-6 HCA
CN 1,4-Benzenediol, polymer with bis(4-fluorophenyl)phenylphosphine
oxide (9CI) (CA INDEX NAME)

CM 1

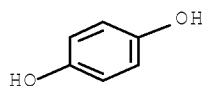
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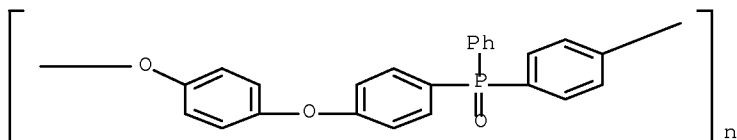
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RN 132139-83-4 HCA

CN Poly[oxy-1,4-phenyleneoxy-1,4-phenylene(phenylphosphinyldiene)-1,4-phenylene] (9CI) (CA INDEX NAME)



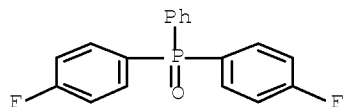
RN 136691-69-5 HCA

CN Methanone, bis(4-fluorophenyl)-, polymer with 1,4-benzenediol and bis(4-fluorophenyl)phenylphosphine oxide (9CI) (CA INDEX NAME)

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CRN 54300-32-2

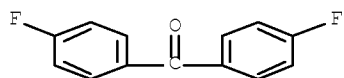
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CM 2

CRN 345-92-6

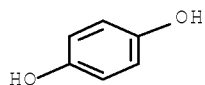
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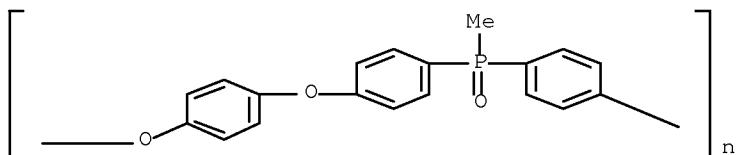
CRN 123-31-9

CMF C6 H6 O2



RN 146027-07-8 HCA

CN Poly[oxy-1,4-phenyleneoxy-1,4-phenylene(methylphosphinyldiene)-1,4-phenylene] (9CI) (CA INDEX NAME)



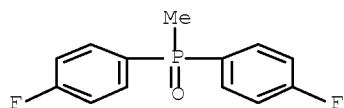
RN 146088-68-8 HCA

CN 1,4-Benzenediol, polymer with bis(4-fluorophenyl)methylphosphine oxide (9CI) (CA INDEX NAME)

CM 1

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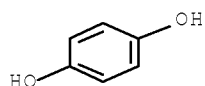
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CM 2

CRN 123-31-9

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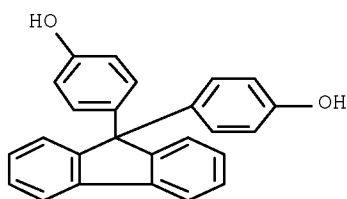
RN 199610-91-8 HCA

CN Methanone, bis(4-fluorophenyl)-, polymer with 1,3-benzenediol and 4,4'-(9H-fluoren-9-ylidene)bis[phenol] (CA INDEX NAME)

CM 1

CRN 3236-71-3

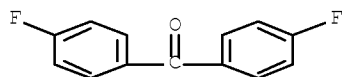
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CM 2

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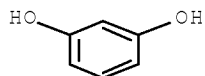
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CM 3

CRN 108-46-3

CMF C6 H6 O2



RN 758706-30-8 HCA

CN 1,4-Benzenediol, polymer with bis(4-fluorophenyl)phenylphosphine oxide and 1,1'-sulfonylbis[4-fluorobenzene] (9CI) (CA INDEX NAME)

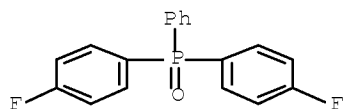
CM 1

October 25, 2010

10/551,576

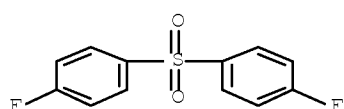
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CRN 54300-32-2
CMF C18 H13 F2 O P



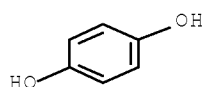
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CM 3

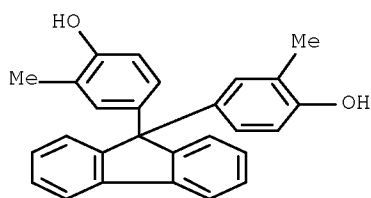
CRN 123-31-9
CMF C6 H6 O2



RN 758706-31-9 HCA
CN Methanone, bis(4-fluorophenyl)-, polymer with 1,4-benzenediol and 4,4'-(9H-fluoren-9-ylidene)bis[2-methylphenol] (9CI) (CA INDEX NAME)

CM 1

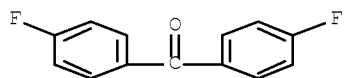
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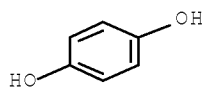
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CM 3

CRN 123-31-9

CMF C6 H6 O2



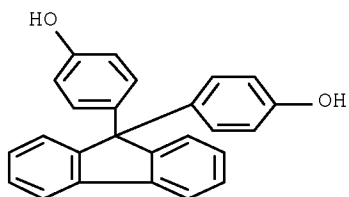
RN 758706-34-2 HCA

CN Methanone, bis(4-fluorophenyl)-, polymer with
[1,1'-biphenyl]-2,5-diol and 4,4'-(9H-fluoren-9-ylidene)bis[phenol]
(9CI) (CA INDEX NAME)

CM 1

CRN 3236-71-3

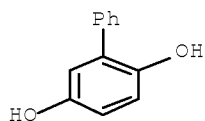
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CM 2

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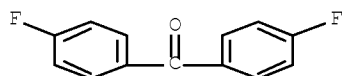
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CM 3

CRN 345-92-6

CMF C13 H8 F2 O



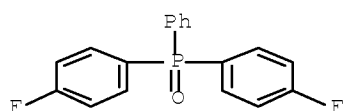
RN 758706-35-3 HCA

CN 1,4-Benzenediol, polymer with bis(4-fluorophenyl)phenylphosphine oxide and 4,4'-(9H-fluoren-9-ylidene)bis[phenol] (9CI) (CA INDEX NAME)

CM 1

CRN 54300-32-2

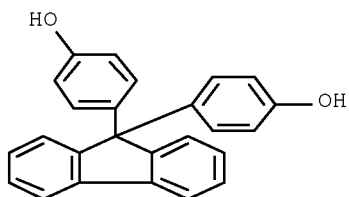
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CM 2

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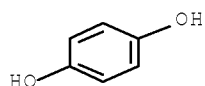
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CM 3

CRN 123-31-9

CMF C6 H6 O2



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 C08G0075-02 [ICS,7]; C08G0075-20 [ICS,7]; C08G0075-00 [ICS,7,C*];
 C08G0065-40 [ICS,7]; C08G0065-00 [ICS,7,C*]; H01B0001-06 [ICS,7]
 IPCR C08G0065-00 [I,C*]; C08G0065-40 [I,A]; C08G0075-00 [I,C*];
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 H01M0008-04 [I,C*]; H01M0008-04 [I,A]; H01M0008-10 [I,C*];
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 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 ST fuel cell polymer electrolyte material
 nonfreezing water fraction control
 IT Polyoxyalkylenes, uses
 (fluorine- and sulfo-containing, ionomers; fuel
 cells containing polymer electrolyte materials with
 controlled nonfreezing water fraction for improved efficiency)
 IT Fuel cell electrolytes
 Fuel cells
 (fuel cells containing polymer electrolyte
 materials with controlled nonfreezing water fraction for improved
 efficiency)
 IT Carbon fibers, uses
 Fluoropolymers, uses
 (fuel cells containing polymer electrolyte
 materials with controlled nonfreezing water fraction for improved
 efficiency)
 IT Fluoropolymers, uses
 (polyoxyalkylene-, sulfo-containing, ionomers; fuel
 cells containing polymer electrolyte materials with
 controlled nonfreezing water fraction for improved efficiency)
 IT Ionomers
 (polyoxyalkylenes, fluorine- and sulfo-containing; fuel
 cells containing polymer electrolyte materials with
 controlled nonfreezing water fraction for improved efficiency)
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 132139-83-4D, sulfonated 136691-69-5D,
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 758706-34-2D, sulfonated 758706-35-3D,
 sulfonated
 (fuel cells containing polymer electrolyte

materials with controlled nonfreezing water fraction for improved efficiency)

RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	File
Dainippon Ink And Chemi	1993			JP 05-271460 A	HCA
Hatanaka, T	2002	37	59	R & D Review of Toyo	HCA
Nitto Denko Corp	2001			JP 2001294705 A	HCA
Nitto Denko Corp	2001			JP 2001294706 A	HCA
Sumitomo Chemical Co Lt	1981			JP 56-34329 B2	HCA
Toa Nenryo Kogyo Kabush	1989			JP 64-22932 A	
Tonen Corp	1996			JP 08-180891 A	HCA
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Toyota Central Research	2002			JP 2002324559 A	HCA
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Victrex Manufacturing L	2002			WO 0119896 A1	HCA
Victrex Manufacturing L	2002			JP 2002524631 A	
Walker, M	1999	74	67	Journal of Applied P	HCA
OS.CITING REF COUNT: 3 THERE ARE 3 CAPLUS RECORDS THAT CITE THIS RECORD (5 CITINGS)					

L94 ANSWER 10 OF 11 HCA COPYRIGHT 2010 ACS on STN
 ACCESSION NUMBER: 139:396487 HCA Full-text
 TITLE: Sulfonated copolymer for polymer electrolyte
 membrane
 INVENTOR(S): Cao, Shuguang; Xu, Helen; Chen, Jingping
 PATENT ASSIGNEE(S): Polyfuel, Inc., USA
 SOURCE: PCT Int. Appl., 32 pp.
 CODEN: PIXXD2
 DOCUMENT TYPE: Patent
 LANGUAGE: English
 FAMILY ACC. NUM. COUNT: 6
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2003095509	A1	20031120	WO 2003-US15178	20030513
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EP 1517929	A1	20050330	EP 2003-736609		
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AB This invention relates to sulfonated copolymers for proton-conducting membranes allowing the dimensional stability of polymer electrolyte membrane over a wide temperature range and avoiding excessive membrane swelling in direct methanol fuel cells. The method for the preparation of a sulfonated polymers is included the steps of combining a first monomer having at least one sulfonate group and having at least two leaving groups with a second comonomer having at least two groups that can displace at least one leaving group of the first monomer and a third comonomer having at least two leaving groups, and a fourth comonomer having at least two displacing groups that can react with the leaving groups of either said first comonomer or said third comonomer and is used for proton exchange membranes, catalyst coated membranes and membrane electrode assembly preparation. Exemplified polymer is prepared by heating of the mixture of 9.13 g of bisphenol A, 5.67 g of 4,4'-difluorobenzophenone, 5.91 g of 4,4'-difluoro-3,3'-disulfonyl-benzophenone and 7.2 g of potassium carbonate in a mixture of DMSO and toluene at 150° for 4 h and keeping at 180° for 6 h with further precipitation with acetone or methanol. The dry polymer is dissolved in DMAC for 20% coating solution and the obtained 2 mil thick membrane is soaked in sulfuric acid for 16 h.

IT 625392-08-7P 625392-10-1P 625392-14-5P
625392-16-7P 625392-26-9P 625392-28-1P
625392-30-5P 625392-32-7P
(sulfonated copolymer for polymer electrolyte membrane)

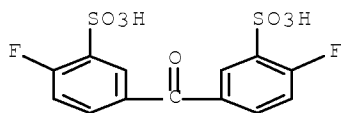
RN 625392-08-7 HCA

CN Benzenesulfonic acid, 3,3'-carbonylbis[6-fluoro-, polymer with 1,4-benzenediol, bis(4-fluorophenyl)methanone and 4,4'-(1-methylethylidene)bis[phenol] (9CI) (CA INDEX NAME)

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CRN 625392-06-5

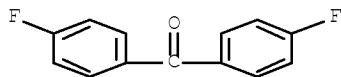
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CM 2

CRN 345-92-6

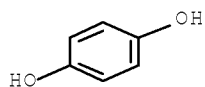
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CRN 123-31-9

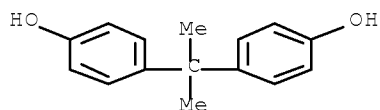
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CM 4

CRN 80-05-7

CMF C15 H16 O2



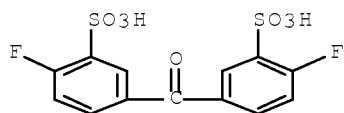
RN 625392-10-1 HCA

CN Benzenesulfonic acid, 3,3'-carbonylbis[6-fluoro-, polymer with
bis(4-fluorophenyl)methanone and 4,4'-thiobis[phenol] (9CI) (CA
INDEX NAME)

CM 1

CRN 625392-06-5

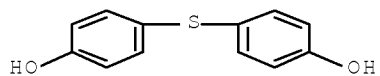
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CM 2

CRN 2664-63-3

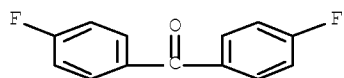
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CM 3

CRN 345-92-6

CMF C13 H8 F2 O



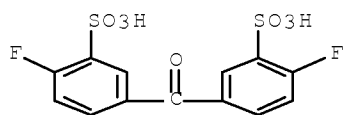
RN 625392-14-5 HCA

CN Benzenesulfonic acid, 3,3'-carbonylbis[6-fluoro-, polymer with
1,4-benzenediol, bis(4-fluorophenyl)methanone and
4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol]
(9CI) (CA INDEX NAME)

CM 1

CRN 625392-06-5

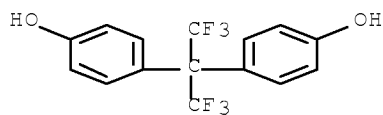
CMF C13 H8 F2 O7 S2



CM 2

CRN 1478-61-1

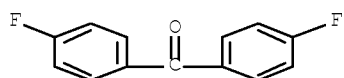
CMF C15 H10 F6 O2



CM 3

CRN 345-92-6

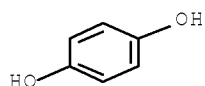
CMF C13 H8 F2 O



CM 4

CRN 123-31-9

CMF C6 H6 O2



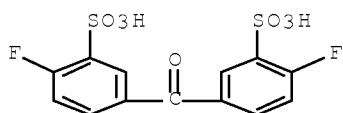
RN 625392-16-7 HCA

CN Benzenesulfonic acid, 3,3'-carbonylbis[6-fluoro-, polymer with
1,4-benzenediol, bis(4-fluorophenyl)methanone and
4,4'-cyclohexylidenebis[phenol] (9CI) (CA INDEX NAME)

CM 1

CRN 625392-06-5

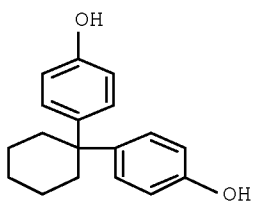
CMF C13 H8 F2 O7 S2



CM 2

CRN 843-55-0

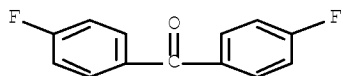
CMF C18 H20 O2



CM 3

CRN 345-92-6

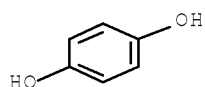
CMF C13 H8 F2 O



CM 4

CRN 123-31-9

CMF C6 H6 O2



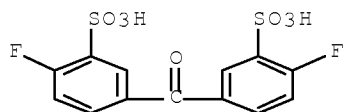
RN 625392-26-9 HCA

CN Benzenesulfonic acid, 3,3'-carbonylbis[6-fluoro-, polymer with
bis(4-fluorophenyl)methanone, 4,4'-cyclohexylidenebis[phenol] and
4,4'-oxybis[phenol] (9CI) (CA INDEX NAME)

CM 1

CRN 625392-06-5

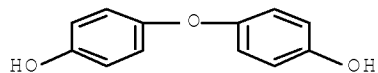
CMF C13 H8 F2 O7 S2



CM 2

CRN 1965-09-9

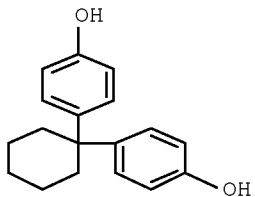
CMF C12 H10 O3



CM 3

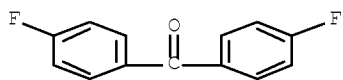
CRN 843-55-0

CMF C18 H20 O2



CM 4

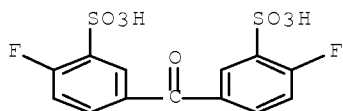
CRN 345-92-6
CMF C13 H8 F2 O



RN 625392-28-1 HCA
CN Benzenesulfonic acid, 3,3'-carbonylbis[6-fluoro-, polymer with
bis(4-fluorophenyl)methanone, 4,4'-(9H-fluoren-9-ylidene)bis[phenol]
and 4,4'-oxybis[phenol] (9CI) (CA INDEX NAME)

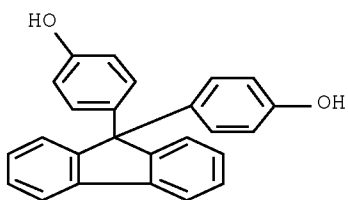
CM 1

CRN 625392-06-5
CMF C13 H8 F2 O7 S2



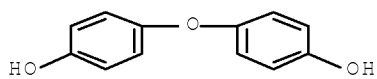
CM 2

CRN 3236-71-3
CMF C25 H18 O2



CM 3

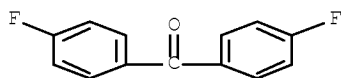
CRN 1965-09-9
CMF C12 H10 O3



CM 4

CRN 345-92-6

CMF C13 H8 F2 O



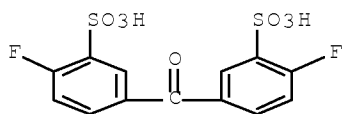
RN 625392-30-5 HCA

CN Benzenesulfonic acid, 3,3'-carbonylbis[6-fluoro-, polymer with
bis(4-fluorophenyl)methanone, 4,4'-oxybis[phenol] and
4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol]
(9CI) (CA INDEX NAME)

CM 1

CRN 625392-06-5

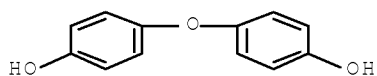
CMF C13 H8 F2 O7 S2



CM 2

CRN 1965-09-9

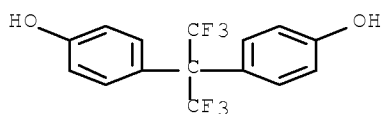
CMF C12 H10 O3



CM 3

CRN 1478-61-1

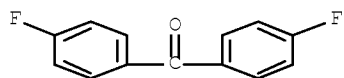
CMF C15 H10 F6 O2



CM 4

CRN 345-92-6

CMF C13 H8 F2 O



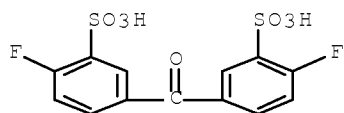
RN 625392-32-7 HCA

CN Benzenesulfonic acid, 3,3'-carbonylbis[6-fluoro-, polymer with
bis(4-fluorophenyl)methanone and 4'-methyl[1,1'-biphenyl]-2,5-diol
(9CI) (CA INDEX NAME)

CM 1

CRN 625392-06-5

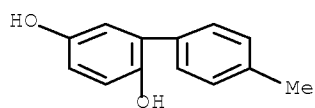
CMF C13 H8 F2 O7 S2



CM 2

CRN 10551-32-3

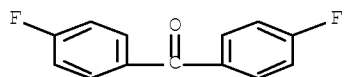
CMF C13 H12 O2



CM 3

CRN 345-92-6

CMF C13 H8 F2 O



IPCR B01D0067-00 [I,C*]; B01D0067-00 [I,A]; B01D0071-00 [I,C*];
B01D0071-52 [I,A]; B01D0071-82 [I,A]; C08F0016-00 [I,C*];
C08F0016-00 [I,A]; C08F0016-36 [I,A]; C08G0065-00 [I,C*];
C08G0065-40 [I,A]; C08G0065-48 [I,A]; C08L0071-00 [I,C*];
C08L0071-00 [I,A]; C08L0081-00 [I,C*]; C08L0081-06 [I,A];
H01M0008-10 [I,C*]; H01M0008-10 [I,A]

CC 37-3 (Plastics Manufacture and Processing)
Section cross-reference(s): 52

ST sulfonated copolymer direct methanol fuel cell;
proton exchange membrane catalyst coated membrane
membrane electrode assembly

IT Polyketones
(polyether-, aromatic, cardo, sulfo-containing; sulfonated copolymer for
polymer electrolyte membrane)

IT Polyketones
(polyether-, aromatic, fluorine-containing, sulfo-containing; sulfonated
copolymer for polymer electrolyte membrane)

IT Polyketones
(polyether-, aromatic, sulfonated; sulfonated copolymer for polymer
electrolyte membrane)

IT Polyketones
(polyether-, ionomers, sulfo-containing; sulfonated copolymer for
polymer electrolyte membrane)

IT Fluoropolymers, preparation
Polythioethers
(polyether-polyketone-, aromatic, sulfo-containing; sulfonated copolymer
for polymer electrolyte membrane)

IT Polysulfones, preparation
(polyether-polyketone-, cardo, sulfo-containing; sulfonated copolymer
for polymer electrolyte membrane)

IT Cardo polymers
(polyether-polyketone-polysulfones, sulfo-containing; sulfonated
copolymer for polymer electrolyte membrane)

IT Cardo polymers
(polyether-polyketones, aromatic, sulfo-containing; sulfonated copolymer
for polymer electrolyte membrane)

IT Polyketones
(polyether-polysulfone-, cardo, sulfo-containing; sulfonated
copolymer for polymer electrolyte membrane)

IT Polyketones
(polyether-polythioether-, aromatic, sulfo-containing; sulfonated
copolymer for polymer electrolyte membrane)

IT Polyethers, preparation
(polyketone-, aromatic, cardo, sulfo-containing; sulfonated copolymer
for polymer electrolyte membrane)

IT Polyethers, preparation
(polyketone-, aromatic, fluorine-containing, sulfo-containing; sulfonated
copolymer for polymer electrolyte membrane)

IT Polyethers, preparation
(polyketone-, aromatic, sulfonated; sulfonated copolymer for polymer
electrolyte membrane)

IT Polyethers, preparation
(polyketone-, ionomers, sulfo-containing; sulfonated copolymer for
polymer electrolyte membrane)

IT Polyethers, preparation
(polyketone-polysulfone-, cardo, sulfo-containing; sulfonated
copolymer for polymer electrolyte membrane)

IT Polyethers, preparation
(polyketone-polythioether-, aromatic, sulfo-containing; sulfonated
copolymer for polymer electrolyte membrane)

IT Fuel cell electrolytes
 Membranes, nonbiological
 (sulfonated copolymer for polymer electrolyte membrane)
 IT 625392-07-6P 625392-08-7P 625392-10-1P
 625392-12-3P 625392-14-5P 625392-16-7P
 625392-17-8P 625392-19-0P 625392-21-4P 625392-23-6P
 625392-25-8P 625392-26-9P 625392-28-1P
 625392-30-5P 625392-32-7P 625392-35-0P
 625392-38-3P
 (sulfonated copolymer for polymer electrolyte
 membrane)

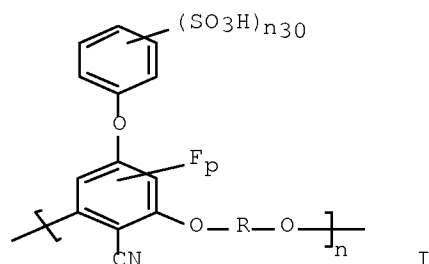
RETABLE

Referenced Author	Year	VOL	PG	Referenced Work	
(RAU)	(RPY)	(RVL)	(RPG)	(RWK)	File
Gan	2001	50	812	Polymer International	HCA
Liu	2001	222	579	Macromol Rapid Commu	
Liu	2001	42	3293	Polymer	HCA
McGrath	2002			US 20020091225 A1	HCA
Wang	1998	199	1421	Macromol Chem Phys	HCA
Xiao	2002	48	309	Polymer Bulletin	HCA
OS.CITING REF COUNT: 5 THERE ARE 5 CAPLUS RECORDS THAT CITE THIS RECORD (5 CITINGS)					

L94 ANSWER 11 OF 11 HCA COPYRIGHT 2010 ACS on STN
 ACCESSION NUMBER: 138:386506 HCA Full-text
 TITLE: Sulfonated fluoropolymers, their resin
 compositions, and fuel cell
 electrolytes therefrom
 INVENTOR(S): Sakaguchi, Yoshimitsu; Kaji, Atsushi; Takase,
 Satoshi; Kimura, Kunio; Gomi, Tomonori; Okumura,
 Yasunori; Omote, Kazushi
 PATENT ASSIGNEE(S): Toyobo Co., Ltd., Japan; Nippon Shokubai Co.,
 Ltd.
 SOURCE: Jpn. Kokai Tokkyo Koho, 28 pp.
 CODEN: JKXXAF
 DOCUMENT TYPE: Patent
 LANGUAGE: Japanese
 FAMILY ACC. NUM. COUNT: 1
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2003147075	A	20030521	JP 2001-352042	200111 16
			<--	
JP 4208455	B2	20090114		
PRIORITY APPLN. INFO.:			JP 2001-352042	200111 16
			<--	

GI

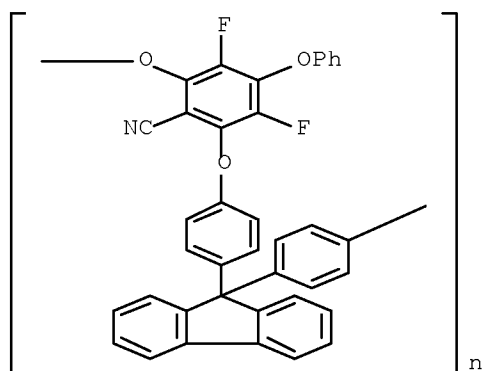


AB The polymers have repeating unit
 $(C_6H_4mFmCOC_6H_4-qXqOC_6H_4-q'X'q'COC_6H_4-m'Fm'ORO)$ [$m, m' = 0-4$ ($m + m' = 1-8$); $X, X' = \text{halo}, C1-6 \text{ alkyl(oxy)}$; $q, q' = 0-4$; $R = \text{sulfonated bivalent residues of (hexafluoro)bisphenol A, bisphenol TP, bisphenol F, 9,9-bis[4-hydroxy(-3-methyl)phenyl]fluorene, etc. (Markush given)}$, or are represented by I ($p = 1, 2$; $R = \text{the same to above}$). Thus, 2.0 g 4,4'-bis(2,3,4,5,6-pentafluorobenzoyl)diphenyl ether was copolymd. with 1.25 g 9,9-bis(4-hydroxyphenyl)fluorene and sulfonated with concentrate H_2SO_4 to give a polymer, which formed a 15- μm -thick cast film showing ion conductivity 0.10 S/cm and 3% weight loss temperature 310°.

IT 343310-33-SDP, sulfonated
 (sulfonated fluoropolymers forming heat-stable
 polyelectrolyte membranes for fuel
 cells)

RN 343310-33-8 HCA

CN Poly[oxy(2-cyano-4,6-difluoro-5-phenoxy-1,3-phenylene)oxy-1,4-phenylene-9H-fluoren-9-ylidene-1,4-phenylene] (CA INDEX NAME)



IPCI C08G0065-40 [I,A]; C08G0065-00 [I,C*]; C08L0071-12 [I,A];
 C08L0071-00 [I,C*]; H01B0001-06 [I,A]; H01M0008-02 [I,A];
 H01M0008-10 [I,A]

IPCR C08G0065-00 [I,C*]; C08G0065-40 [I,A]; H01B0001-06 [I,C*];
 H01B0001-06 [I,A]; H01M0008-02 [I,C*]; H01M0008-02 [I,A];
 H01M0008-10 [I,C*]; H01M0008-10 [I,A]; C08L0071-00 [I,C];
 C08L0071-12 [I,A]

CC 38-3 (Plastics Fabrication and Uses)

Section cross-reference(s): 52

ST hydroxyphenylfluorene fluorobenzoyldiphenyl ether polyelectrolyte

fuel cell; heat stable polyelectrolyte sulfonated
cardo fluoropolymer; sulfonated phenoxyfluorobenzonitrile
hydroxyphenylfluorene electrolytic membrane

- IT Fluoropolymers, uses
(cardo, cyano, polyoxyarylenes; properly sulfonated
fluoropolymers forming heat-stable polyelectrolyte
membranes for fuel cells)
- IT Polyoxyarylenes
(cardo, fluorine-containing, sulfonated; properly sulfonated
fluoropolymers forming heat-stable polyelectrolyte
membranes for fuel cells)
- IT Cardo polymers
(fluorine-containing, cyano, polyoxyarylenes; properly sulfonated
fluoropolymers forming heat-stable polyelectrolyte
membranes for fuel cells)
- IT Cardo polymers
(polyoxyarylenes, fluorine-containing, sulfonated; properly
sulfonated fluoropolymers forming heat-stable polyelectrolyte
membranes for fuel cells)
- IT Fuel cell electrolytes
Heat-resistant materials
Polyelectrolytes
(sulfonated fluoropolymers forming heat-stable polyelectrolyte
membranes for fuel cells)
- IT Fluoropolymers, uses
(sulfonated; sulfonated fluoropolymers forming heat-stable
polyelectrolyte membranes for fuel
cells)
- IT 213693-06-2DP, sulfonated 213693-07-3DP, sulfonated
213693-10-8DP, sulfonated 213693-11-9DP, sulfonated
343310-32-7DP, sulfonated 343310-33-8DP,
sulfonated 524932-24-9DP, sulfonated 524945-32-2DP,
sulfonated
(sulfonated fluoropolymers forming heat-stable
polyelectrolyte membranes for fuel
cells)

OS.CITING REF COUNT: 3 THERE ARE 3 CAPLUS RECORDS THAT CITE THIS
RECORD (3 CITINGS)

----- (CRYSTALLINE MATERIAL--CLAIM 7) -----

=> D L96 1-5 IBIB ABS HITSTR HITIND RETABLE

L96 ANSWER 1 OF 5 HCA COPYRIGHT 2010 ACS on STN
ACCESSION NUMBER: 145:30867 HCA Full-text
TITLE: Membrane electrode
assemblies (MEA) in polymer electrolyte
fuel cells
INVENTOR(S): Fukuda, Kaoru; Matsuo, Junji
PATENT ASSIGNEE(S): Honda Motor Co., Ltd., Japan
SOURCE: Jpn. Kokai Tokkyo Koho, 13 pp.
CODEN: JKXXAF
DOCUMENT TYPE: Patent
LANGUAGE: Japanese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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JP 2006140107

A

20060601

JP 2004-330859

200411
15

PRIORITY APPLN. INFO.:

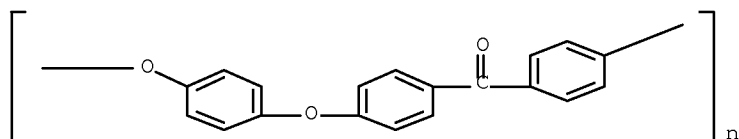
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JP 2004-330859200411
15

AB The ~~anode~~ in the title MEA comprises a catalyst layer containing 1st catalyst-carrying particles and a 1st ion conductor, a water decomposition layer containing a 2nd catalyst-carrying particles, 2nd ion conductor, and ~~crystalline~~ C fibers, and a gas diffusion layer, in which the water content in the 2nd ion conductor is larger than that in the 1st ion conductor. Fuel cells with ~~electrodes~~ showing prevented performance drop on fuel shortage are obtained.

IT 31694-16-3D, PEEK, sulfonated
(ion conductor in water decomposition layer; ~~anodes~~ in MEA with catalyst layers and water decomposition layers containing ion conductors with different water contents)

RN 31694-16-3 HCA

CN Poly(oxy-1,4-phenyleneoxy-1,4-phenylenecarbonyl-1,4-phenylene) (CA INDEX NAME)



IPCI H01M0008-02 [I,A]; H01M0004-86 [I,A]; H01M0004-92 [I,A]; H01M0004-90 [I,C*]; H01M0004-96 [I,A]; H01M0008-10 [I,A]

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST ~~membrane electrode assembly anode~~
catalyst; ion conductor water content control ~~anode~~ MEA

IT Ionic conductors
(~~anodes~~ in MEA with catalyst layers and water decomposition layers containing ion conductors with different water contents)

IT Carbon fibers, uses
(~~crystalline~~, in water decomposition layer; ~~anodes~~ in MEA with catalyst layers and water decomposition layers containing ion conductors with different water contents)

IT Carbon black, uses
(in ~~anode~~ catalyst layer; ~~anodes~~ in MEA with catalyst layers and water decomposition layers containing ion conductors with different water contents)

IT Fuel cell ~~anodes~~
(~~membrane electrode assemblies~~; ~~anodes~~ in MEA with catalyst layers and water decomposition layers containing ion conductors with different water contents)

IT Polyketones
(polyether-, sulfonated, ion conductor in water decomposition layer; ~~anodes~~ in MEA with catalyst layers and water decomposition layers containing ion conductors with different water contents)

IT Polyethers, uses
(polyketone-, sulfonated, ion conductor in water decomposition layer; ~~anodes~~ in MEA with catalyst layers and water decomposition

layers containing ion conductors with different water contents)

IT Fuel cells
(polymer electrolyte; ~~anodes~~ in MEA with catalyst layers and water decomposition layers containing ion conductors with different water contents)

IT Platinum alloy, base
Ruthenium alloy, base
(~~anodes~~ in MEA with catalyst layers and water decomposition layers containing ion conductors with different water contents)

IT 7440-06-4, Platinum, uses 7440-18-8, Ruthenium, uses 12779-05-4
(~~anodes~~ in MEA with catalyst layers and water decomposition layers containing ion conductors with different water contents)

IT 501004-25-7, TEC 61E54
(in water decomposition layer; ~~anodes~~ in MEA with catalyst layers and water decomposition layers containing ion conductors with different water contents)

IT 864442-38-6, Nafion DE 2021 888716-81-2, Flemion SH 20
(ion conductor in ~~anode~~ catalyst layer; ~~anodes~~ in MEA with catalyst layers and water decomposition layers containing ion conductors with different water contents)

IT 31694-16-3D, PEEK, sulfonated
(ion conductor in water decomposition layer; ~~anodes~~ in MEA with catalyst layers and water decomposition layers containing ion conductors with different water contents)

L96 ANSWER 2 OF 5 HCA COPYRIGHT 2010 ACS on STN
ACCESSION NUMBER: 142:300971 HCA Full-text
TITLE: Ion exchange composite material based on proton conductive functionalized inorganic support compounds in a polymer matrix
INVENTOR(S): St.-Arnaud, Marc; Bebin, Philippe
PATENT ASSIGNEE(S): Can.
SOURCE: U.S. Pat. Appl. Publ., 20 pp., Cont.-in-part of Appl. No. PCT/CA03/00435.
CODEN: USXXCO
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 2
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 20050053818	A1	20050310	US 2004-949022	20040924
WO 2003083985	A2	20031009	WO 2003-CA435	20030326
WO 2003083985	A3	20041216		

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW

RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ,

BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK,
 EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE,
 SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR,
 NE, SN, TD, TG

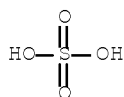
CA 2494430 A1 20060324 CA 2005-2494430 200501
 26
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 EP 1646097 A2 20060412 EP 2005-20419 200509
 20
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 EP 1646097 A3 20081001
 EP 1646097 B1 20100804
 R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC,
 PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU,
 PL, SK, BA, HR, IS, YU
 AT 476761 T 20100815 AT 2005-20419 200509
 20
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 PRIORITY APPLN. INFO.: US 2002-367771P P 200203
 28
 <--
 WO 2003-CA435 A2 200303
 26
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 US 2004-949022 A 200409
 24
 <--

AB The composite material comprises acid functionalized inorg. supports such as silica dispersed in a functionalized and/or non-functionalized polymer matrix that is based on numerous polymers such as poly(aromatic ether ketones), or poly(benzoyl phenylene), or derivs. thereof. The composite material is characterized by good water retention capabilities due to the acidic functions and the hydrophilicity of the silica particles. Moreover, a good impermeability to gas and liquid fuels commonly used in fuel cell technol., like hydrogen gas or methanol solution, is also obtained due to the presence of silica particles. Good mech. properties of the composite material let the material to be formed easily in thin film or membrane form. In that form, the composite material is usable for proton exchange membrane for fuel cells, for drying or humidifying membrane for gas or solvent conditioning, or as acid catalytic membrane.

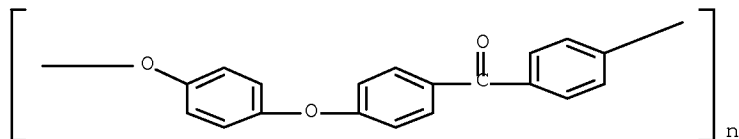
IT 7664-93-9, Sulfuric acid, processes
 (ion exchange composite material based on proton conductive
 functionalized inorg. support compds. in polymer matrix)

RN 7664-93-9 HCA

CN Sulfuric acid (CA INDEX NAME)



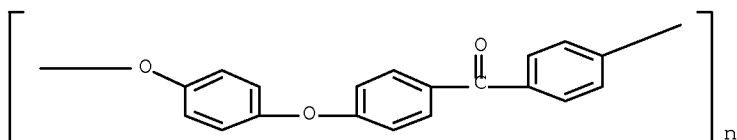
IT 31694-16-3D, PEEK, sulfonated
 (ion exchange composite material based on proton conductive
 functionalized inorg. support compds. in polymer matrix)
 RN 31694-16-3 HCA
 CN Poly(oxy-1,4-phenyleneoxy-1,4-phenylenecarbonyl-1,4-phenylene) (CA
 INDEX NAME)



INCL 429030000; 429033000; 429046000; 204296000; 429044000; 429041000
 IPCI H01M0008-10 [ICM,7]; H01M0004-86 [ICS,7]; H01M0004-90 [ICS,7];
 H01M0004-96 [ICS,7]; H01M0008-08 [ICS,7]; H01M0008-14 [ICS,7];
 C25B0013-00 [ICS,7]; C25C0007-04 [ICS,7]; C25C0007-00 [ICS,7,C*]
 IPCR C25B0013-00 [I,C*]; C25B0013-00 [I,A]; C25C0007-00 [I,C*];
 C25C0007-04 [I,A]; H01M0004-86 [I,C*]; H01M0004-86 [I,A];
 H01M0004-90 [I,C*]; H01M0004-90 [I,A]; H01M0004-96 [I,C*];
 H01M0004-96 [I,A]; H01M0008-08 [I,C*]; H01M0008-08 [I,A];
 H01M0008-10 [I,C*]; H01M0008-10 [I,A]; H01M0008-14 [I,C*];
 H01M0008-14 [I,A]
 NCL 429/431.000; 204/296.000; 429/493.000; 429/516.000
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 Section cross-reference(s): 38, 48, 56, 61, 72
 ST fuel cell composite inorg compd polymer matrix
 IT Membranes, nonbiological
 (catalytic, acid; ion exchange composite material based on proton
 conductive functionalized inorg. support compds. in polymer
 matrix)
 IT Membranes, nonbiological
 (desalination; ion exchange composite material based on proton
 conductive functionalized inorg. support compds. in polymer
 matrix)
 IT Air conditioning
 Composites
 Ion exchangers
 Liquid crystals, polymeric
 Sulfonation
 (ion exchange composite material based on proton conductive
 functionalized inorg. support compds. in polymer matrix)
 IT Separation
 (membranes; ion exchange composite material based on
 proton conductive functionalized inorg. support compds. in
 polymer matrix)
 IT Fuel cells
 (proton exchange membrane; ion exchange composite
 material based on proton conductive functionalized inorg. support
 compds. in polymer matrix)
 IT 110-86-1, Pyridine, processes 302-04-5, Thiocyanate, processes
 420-04-2, Cyanamide 661-20-1, Isocyanate 7664-38-2, Phosphoric
 acid, processes 7664-93-9, Sulfuric acid, processes
 7803-51-2, Phosphine 13598-36-2, Phosphonic acid 13840-40-9,
 Phosphine oxide 14265-44-2, Phosphate, processes 15477-76-6,
 Phosphonate 32323-01-6, Imide
 (ion exchange composite material based on proton conductive

functionalized inorg. support compds. in polymer matrix)
 IT 1314-23-4, Zirconium oxide, uses 1344-28-1, Alumina, uses
 7631-86-9D, Silica, acid functionalized 7631-86-9D, Silica,
 carboxylic acid functionalized 7631-86-9D, Silica, phosphonic acid
 functionalized 7631-86-9D, Silica, propylamine-functionalized
 7631-86-9D, Silica, sulfonic acid functionalized 9002-84-0, Ptfе
 9002-86-2, Polyvinyl chloride 9002-88-4, Polyethylene 9003-07-0,
 Polypropylene 9003-53-6, Polystyrene 9003-56-9,
 Acrylonitrile-butadiene-styrene copolymer 9004-34-6, Cellulose,
 uses 13463-67-7, Titanium oxide, uses 24937-78-8, Ethylene-vinyl
 acetate copolymer 31694-16-3, Peek ~~31694-16-3D~~, PEEK,
~~sulfonated~~ 52352-27-9 150385-13-0,
 Poly(benzoyl-1,4-phenylene) 223537-84-6
 (ion exchange composite material based on proton conductive
 functionalized inorg. support compds. in polymer matrix)
 OS.CITING REF COUNT: 3 THERE ARE 3 CAPLUS RECORDS THAT CITE THIS
 RECORD (3 CITINGS)

L96 ANSWER 3 OF 5 HCA COPYRIGHT 2010 ACS on STN
 ACCESSION NUMBER: 142:177887 HCA Full-text
 TITLE: Polymer sulfonation - a versatile route to
 preparing proton-conducting ~~membrane~~
 material for advanced technologies
 AUTHOR(S): Zaidi, S. M. Javaid
 CORPORATE SOURCE: Chemical Engineering Department, King Fahd
 University of Petroleum & Minerals, Dhahran,
 Saudi Arabia
 SOURCE: Arabian Journal for Science and Engineering,
 Section B: Engineering (2003), 28(2B),
 183-194
 CODEN: AJSEF2; ISSN: 1319-8025
 PUBLISHER: King Fahd University of Petroleum and Minerals
 DOCUMENT TYPE: Journal
 LANGUAGE: English
 AB Sulfonation of polymers is a viable method for making proton exchange
~~membranes~~ used in electrochem. devices. Polyether-ether ketone was modified by
 using concentrated H2SO4 (97.4%) to produce ion-containing polymers bearing
 HSO3 groups. The sulfonated polymer was characterized for IEC, 1HNMR, DSC,
 and H2O uptake etc. The degree of sulfonation of sulfonated PEEK was found to
 vary 40-80 mol%. The PEEK became amorphous after sulfonation (DSC and WXRД),
 which enhanced its solubility in organic solvents such as DMF. The glass
 transition temperature, Tg increased from 151° for pure PEEK to 217° upon
 sulfonation. The H2O uptake was also increased with sulfonation level, which
 provides formation of water-mediated pathways for protons involving SO3H
 groups. The ~~membranes~~ from these polymers have a high potential for use in
 electrochem. devices such as polymer fuel cell and electrodialysis.
 IT ~~31694-16-3DP~~, sulfonated
 (sulfonated PEEK as proton-conducting ~~membrane~~
 material)
 RN 31694-16-3 HCA
 CN Poly(oxy-1,4-phenyleneoxy-1,4-phenylenecarbonyl-1,4-phenylene) (CA
 INDEX NAME)



CC 38-3 (Plastics Fabrication and Uses)
 Section cross-reference(s): 37

ST polyether polyketone sulfonated proton exchange membrane;
 fuel cell separator polyether polyketone
 sulfonated

IT Polyketones
 (polyether-, sulfonated, aromatic; sulfonated PEEK as
 proton-conducting membrane material)

IT Polyethers, uses
 (polyketone-, sulfonated, aromatic; sulfonated PEEK as
 proton-conducting membrane material)

IT Sulfonation
 (property modification by; sulfonated PEEK as proton-conducting
 membrane material)

IT Fuel cells
 (proton exchange membrane; sulfonated PEEK as
 proton-conducting membrane material)

IT Ionic conductors
 (protonic; sulfonated PEEK as proton-conducting membrane
 material)

IT Crystallinity
 Fuel cell separators
 Glass transition temperature
 Solubility
 (sulfonated PEEK as proton-conducting membrane
 material)

IT 31694-16-3DP, sulfonated
 (sulfonated PEEK as proton-conducting membrane
 material)

RETABLE

Referenced Author	Year	VOL	PG	Referenced Work	
Referenced					
(RAU)	(RPY)	(RVL)	(RPG)	(RWK)	File
=====	+	+	+	+	+
==					
Appleby, A	1996	354	1681	Phil Trans Royal Soc	HCA
Atwood, T	1979	20	191	Polym Prep, Am Chem	
Bailly, C	1987	28	1009	Polymer	HCA
Bellamy, L	1966		64	The Infrared Spectra	
Bishop, M	1985	18	86	Macromolecules	HCA
Cerfontain, H	1968			Mechanical Aspect in	
Cui, W	1998	14	145	Separation and Purif	HCA
Drzewinski, M	1985	30	4753	J Appl Polym Sci	
Faure, S	1997		818	2nd Int Symp on New	HCA
Jin, X	1985	17	4	British Polym J	HCA
Kobayashi, T	1998	106	219	Solid State Ionics	HCA
Liler, M	1971			Reaction Mechanisms	
Nakanishi, K	1962		28	Infrared Absorption	
Nolte, R	1993	83	211	J Membrane Sci	HCA
Noshay, A	1976	20	1885	J Appl Polym Sci	HCA
O'Gara, J	1987	25	1519	J Polym Sci B: Polym	HCA
Rikukawam, K	2000	25	1463	Progress in Polymer	
Savadogo, O	1998	1	66	J New Mat Electroche	
Shoesmith, J	1994	49	129	J Power Source	HCA
Sivashinsky, N	1983	28	3235	J Appl Polym Sci	HCA
Steck, A	1997		792	Proc 2nd Int Symp on	HCA
Zaidi, S	2000	173	17	J Membrane Science	HCA
Zaidi, S	2000			PhD Thesis, Laval Un	

October 25, 2010

10/551,576

140

OS.CITING REF COUNT: 7 THERE ARE 7 CAPLUS RECORDS THAT CITE THIS
RECORD (7 CITINGS)

L96 ANSWER 4 OF 5 HCA COPYRIGHT 2010 ACS on STN
ACCESSION NUMBER: 136:343296 HCA Full-text
TITLE: Solid polymer electrolyte
INVENTOR(S): Hasegawa, Naoki; Taniguchi, Takumi; Kamiya,
Atsushi; Kawakado, Masaya; Morimoto, Tomo
PATENT ASSIGNEE(S): Toyota Central Research and Development
Laboratories, Inc., Japan
SOURCE: Jpn. Kokai Tokkyo Koho, 9 pp.
CODEN: JKXXAF
DOCUMENT TYPE: Patent
LANGUAGE: Japanese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

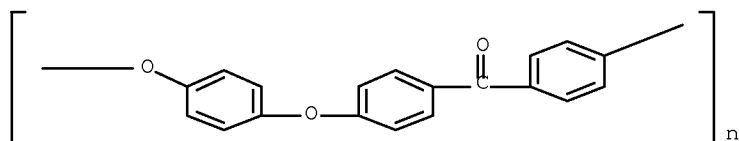
PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
-----	---	-----	-----	
JP 2002124272	A	20020426	JP 2000-315996	200010 17
			<--	
PRIORITY APPLN. INFO.:			JP 2000-315996	200010 17
			<--	

AB The electrolyte is a polymer electrolyte heat treated at $T \pm 50^\circ$ T = crystal
m.p. or softening point of the electrolyte, during or after electron beam or
radiation treatment.

IT 31694-16-3D, Peek, sulfonated
(heat and electron beam and radiation treatment of polymer
electrolyte membranes for fuel cells
and electrochem. devices)

RN 31694-16-3 HCA

CN Poly(oxy-1,4-phenyleneoxy-1,4-phenylenecarbonyl-1,4-phenylene) (CA
INDEX NAME)



IPCI H01M0008-02 [ICM,7]; C08J0003-28 [ICS,7]; G01N0027-416 [ICS,7];
G01N0027-406 [ICS,7]; H01B0001-06 [ICS,7]; H01M0008-10 [ICS,7];
C08L0101-00 [ICS,7]

IPCR G01N0027-406 [I,C*]; G01N0027-406 [I,A]; C08J0003-28 [I,C*];
C08J0003-28 [I,A]; G01N0027-416 [I,C*]; G01N0027-416 [I,A];
H01B0001-06 [I,C*]; H01B0001-06 [I,A]; H01M0008-02 [I,C*];
H01M0008-02 [I,A]; H01M0008-10 [I,C*]; H01M0008-10 [I,A]

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 72

ST polymer electrolyte treatment heat electron beam; radiation heat
treatment polymer electrolyte; fuel cell polymer
electrolyte

IT Electric apparatus
 (electrochem.; heat and electron beam and radiation treatment of
 polymer electrolyte ~~membranes~~ for fuel
 cells and electrochem. devices)

IT Fuel cell electrolytes
 Sensors
 (heat and electron beam and radiation treatment of polymer
 electrolyte ~~membranes~~ for fuel cells
 and electrochem. devices)

IT Fluoropolymers, uses
 (heat and electron beam and radiation treatment of polymer
 electrolyte ~~membranes~~ for fuel cells
 and electrochem. devices)

IT 24937-79-9, Poly(vinylidene fluoride) 31694-16-3D, Peek,
 sulfonated 163294-14-2, Nafion 112 417702-20-6D,
 perfluoroalkylsulfonic acid ethers derivs., polymers 418770-63-5,
 Nafion 112F
 (heat and electron beam and radiation treatment of polymer
 electrolyte ~~membranes~~ for fuel cells
 and electrochem. devices)

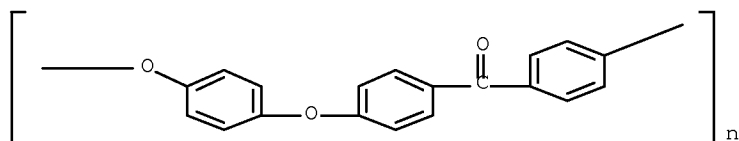
L96 ANSWER 5 OF 5 HCA COPYRIGHT 2010 ACS on STN
 ACCESSION NUMBER: 130:40853 HCA Full-text
 TITLE: Low cost ~~membranes~~ for PEM
 fuel cells
 AUTHOR(S): Yen, Shiao-Ping "Elizabeth"; Kindler, Andrew;
 Yavrouian, Andre
 CORPORATE SOURCE: Jet Propulsion Laboratory, Pasadena, CA,
 91109-8099, USA
 SOURCE: Proceedings of the Power Sources Conference (
 1998), 38th, 469-472
 CODEN: PPOCFD
 PUBLISHER: National Technical Information Service
 DOCUMENT TYPE: Journal
 LANGUAGE: English

AB Aromatic ~~semicryst.~~ polymers such as poly p-Ph ether-ether ketone (PEEK) and
 poly-p-Ph ether sulfone (PES) were used as starting materials to produce
 proton conducting ionomers. These are sulfonated poly p-Ph ether-ether ketone
 (H-SPEEK) and sulfonated poly-p-Ph ether sulfone (H-SPES), resp. After
 numerous expts. with these 2 polymers it was determined that mixture of HSPES
 and PES or mixts. of different equivalent wts. of HSPES could be cast into
 useful, robust ~~membranes~~. The newly prepared proton conducting ~~membranes~~ were
 incorporated into ~~membrane electrode~~ assemblies (MEA) and tested as working
 MeOH fuel cells. The best HSPES MEA delivered 387 mV at 300 mA/cm², at 91°
 and 20 psig air using 1M MeOH.

IT 31694-16-3D, Peek, sulfonated
 (low cost ~~membranes~~ for PEM fuel
 cells)

RN 31694-16-3 HCA

CN Poly(oxy-1,4-phenyleneoxy-1,4-phenylenecarbonyl-1,4-phenylene) (CA
 INDEX NAME)



CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 Section cross-reference(s): 38
 ST fuel cell membrane sulfonated polymer
 IT Fuel cells
 (MeOH; low cost membranes for PEM fuel
 cells)
 IT Electric conductivity
 Fuel cell electrolytes
 (low cost membranes for PEM fuel
 cells)
 IT Polyketones
 Polyketones
 Polysulfones, uses
 Polysulfones, uses
 (polyether-, aromatic, sulfonated; low cost membranes for
 PEM fuel cells)
 IT Polyethers, uses
 Polyethers, uses
 (polyketone-, aromatic, sulfonated; low cost membranes for
 PEM fuel cells)
 IT Polyethers, uses
 Polyethers, uses
 (polysulfone-, aromatic, sulfonated; low cost membranes
 for PEM fuel cells)
 IT Ionomers
 (proton conducting; low cost membranes for PEM
 fuel cells)
 IT 25667-42-9 31694-16-3D, Peek, sulfonated
 (low cost membranes for PEM fuel
 cells)
 IT 67-56-1, Methanol, uses
 (low cost membranes for PEM fuel
 cells)

RETABLE

Referenced Author	Year	VOL	PG	Referenced Work	
(RAU)	(RPY)	(RVL)	(RPG)	(RWK)	File

=====+=====+=====+=====+=====+=====

Bailly, C	1987	28	1009	Polymer	HCA
Linkous, C	1993	68	122	Proceedings of the A	HCA
Nolte, R	1993	83	211	J of Membrane Scienc	HCA

----- (METHOD OF SULFONATING-CLAIMS 20-26) -----

=> D L98 1-21 IBIB ABS HITSTR HITIND RETABLE
 THE ESTIMATED COST FOR THIS REQUEST IS 123.48 U.S. DOLLARS
 DO YOU WANT TO CONTINUE WITH THIS REQUEST? (Y)/N:Y

L98 ANSWER 1 OF 21 HCA COPYRIGHT 2010 ACS on STN
 ACCESSION NUMBER: 148:356260 HCA Full-text
 TITLE: Crosslinkable aromatic resin having protonic
 acid group, and ion conductive polymer
 membrane, binder and fuel
 cell using the resin
 INVENTOR(S): Ishikawa, Junichi; Kuroki, Takashi; Fujiyama,
 Satoko; Omi, Takehiko; Nakata, Tomoyuki; Okawa,
 Yuichi; Miyazaki, Kazuhisa; Fujii, Shigeharu;

PATENT ASSIGNEE(S): Tamai, Shoji
 SOURCE: Mitsui Chemicals, Inc., Japan
 U.S., 55pp.
 CODEN: USXXAM
 DOCUMENT TYPE: Patent
 LANGUAGE: English
 FAMILY ACC. NUM. COUNT: 2
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 7345135	B2	20080318	US 2004-820842	20040409
			<--	
US 20040191602	A1	20040930		
WO 2003033566	A1	20030424	WO 2002-JP10536	20021010
			<--	
W: CA, CN, IN, JP, KR, US				
RW: DE, FR, GB, IT, SE				
PRIORITY APPLN. INFO.:			JP 2001-312799	A 20011010
			<--	
			JP 2002-182252	A 20020621
			<--	
			WO 2002-JP10536	A2 20021010
			<--	

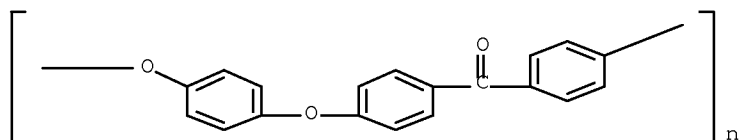
ASSIGNMENT HISTORY FOR US PATENT AVAILABLE IN LSUS DISPLAY FORMAT

AB A crosslinkable aromatic resin(such as polyethers, polyamides, polyimides, polyamideimides, polyazoles) having a protonic acid group and a crosslinkable group is prepared for suitable for electrolytic ~~membranes~~ and binders used in ~~fuel cells~~. The crosslinking is not derived from the protonic acid group and the resin can form a polymer network without any elimination component and exhibits excellent ion conductivity, heat resistance, water resistance, adhesion property and low methanol permeability. Preferably, the crosslinkable group is composed of a Cl-10 group directly bonded to the aromatic ring and/or an alkylene group having 1-3 carbon atoms in the main chain in which at least one carbon atom directly bonded to the aromatic ring bonds to hydrogen, and a carbonyl group, or a carbon-carbon double bond or triple bond. Thus, a polyether-polysulfone was prepared from disodium 3,3'-disulfonate-4,4'-difluorobenzophenone, 4,4'-difluorobenzophenone and 2,2-bis(3,5-dimethyl-4-hydroxyphenyl)propane.

IT 31694-16-3DP, PEEK450P, sulfonated
 (PEEK450P; crosslinkable aromatic resin having protonic acid group for ion conductive polymer ~~membrane~~ used for binder and ~~fuel cell~~)

RN 31694-16-3 HCA

CN Poly(oxy-1,4-phenyleneoxy-1,4-phenylenecarbonyl-1,4-phenylene) (CA INDEX NAME)



IT 515144-48-6P 1012792-22-1DP, sulfonated
 (crosslinkable aromatic resin having protonic acid group for ion
 conductive polymer membrane used for binder and
 fuel cell)

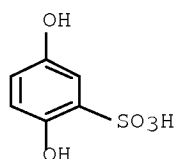
RN 515144-48-6 HCA

CN Benzenesulfonic acid, 2,5-dihydroxy-, sodium salt (1:1), polymer
 with bis(4-fluorophenyl)methanone and
 2,3,5,6-tetramethyl-1,4-benzenediol (CA INDEX NAME)

CM 1

CRN 10021-55-3

CMF C6 H6 O5 S . Na

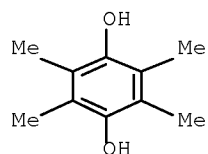


● Na

CM 2

CRN 527-18-4

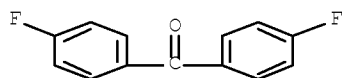
CMF C10 H14 O2



CM 3

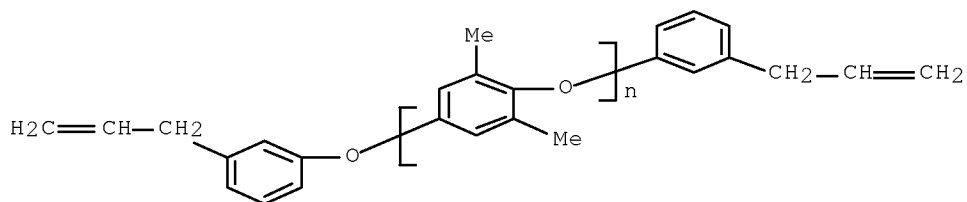
CRN 345-92-6

CMF C13 H8 F2 O



RN 1012792-22-1 HCA

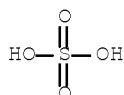
CN Poly[oxy(2,6-dimethyl-1,4-phenylene)],
 α -[3-(2-propen-1-yl)phenyl]- ω -[3-(2-propen-1-yl)phenoxy]-
 (CA INDEX NAME)



IT 7664-93-9, Sulfuric acid, reactions
 (crosslinkable aromatic resin having protonic acid group for ion
 conductive polymer ~~membrane~~ used for binder and
 fuel cell)

RN 7664-93-9 HCA

CN Sulfuric acid (CA INDEX NAME)



INCL 528220000; 525330900; 525331200; 525328600; 429030000; 429034000;
 429042000; 429310000; 429316000; 429317000
 IPCI C08G0002-18 [I,A]; C08G0002-00 [I,C*]; C08G0006-00 [I,A]
 IPCR C08G0002-00 [I,C]; C08G0002-18 [I,A]; C08G0006-00 [I,C]; C08G0006-00
 [I,A]; C08G0065-00 [I,C*]; C08G0065-48 [I,A]; C08J0005-20 [I,C*];
 C08J0005-22 [I,A]; C08L0071-00 [I,C*]; C08L0071-00 [I,A];
 C08L0071-12 [I,A]; C08L0081-00 [I,C*]; C08L0081-06 [I,A];
 H01M0004-86 [N,C*]; H01M0004-86 [N,A]; H01M0004-88 [I,C*];
 H01M0004-88 [I,A]; H01M0004-90 [N,C*]; H01M0004-92 [N,A];
 H01M0008-10 [I,C*]; H01M0008-10 [I,A]
 NCL 528/220.000; 429/310.000; 429/316.000; 429/317.000; 429/493.000;
 429/510.000; 429/530.000; 525/328.600; 525/330.900; 525/331.200;
 429/311.000; 429/312.000
 CC 35-5 (Chemistry of Synthetic High Polymers)
 ST arom polyether polyamide polyimide polyamideimide polyazole
 polysulfone; conductive polymer ~~fuel cell~~
~~membrane~~ crosslinking; disodium
 disulfonatedifluorobenzophenone difluorobenzophenone
 bisdimethylhydroxyphenylpropane copolymer prepn
 IT Anodes
 Cathodes

Conducting polymers

Electrodes

Fuel cell separators

Sulfonation

(crosslinkable aromatic resin having protonic acid group for ion
conductive polymer membrane used for binder and
fuel cell)

IT Polyamides

Polybenzoxazoles

Polyimides

Polyoxyphenylenes

(crosslinkable aromatic resin having protonic acid group for ion
conductive polymer membrane used for binder and
fuel cell)

IT Crosslinking

(photochem.; crosslinkable aromatic resin having protonic acid group
for ion conductive polymer membrane used for binder and
fuel cell)

IT Polyketones

(polyamic acid-; crosslinkable aromatic resin having protonic acid
group for ion conductive polymer membrane used for
binder and fuel cell)

IT Polysulfones

(polyamic acid-polyketone-; crosslinkable aromatic resin having
protonic acid group for ion conductive polymer membrane
used for binder and fuel cell)

IT Polyketones

(polyamic acid-polysulfone-; crosslinkable aromatic resin having
protonic acid group for ion conductive polymer membrane
used for binder and fuel cell)

IT Polyimides

Polyketones

(polyamide-; crosslinkable aromatic resin having protonic acid group
for ion conductive polymer membrane used for binder and
fuel cell)

IT Polysulfones

(polyamide-polyester-; crosslinkable aromatic resin having protonic
acid group for ion conductive polymer membrane used for
binder and fuel cell)

IT Polysulfones

(polyamide-polyketone-; crosslinkable aromatic resin having protonic
acid group for ion conductive polymer membrane used for
binder and fuel cell)

IT Polyesters

Polyketones

(polyamide-polysulfone-; crosslinkable aromatic resin having
protonic acid group for ion conductive polymer membrane
used for binder and fuel cell)

IT Polyethers

(polybenzoxazole-, fluorine-containing; crosslinkable aromatic resin
having protonic acid group for ion conductive polymer
membrane used for binder and fuel cell
)

IT Fluoropolymers

(polybenzoxazole-polyether-; crosslinkable aromatic resin having
protonic acid group for ion conductive polymer membrane
used for binder and fuel cell)

IT Polyamides

(polyester-polysulfone-; crosslinkable aromatic resin having
protonic acid group for ion conductive polymer membrane

- used for binder and fuel cell)
- IT Polybenzoxazoles
Polyketones
(polyether-, fluorine-containing; crosslinkable aromatic resin having
protonic acid group for ion conductive polymer membrane
used for binder and fuel cell)
- IT Polyketones
Polyphenyls
Polysulfides
Polysulfones
Polysulfones
(polyether-; crosslinkable aromatic resin having protonic acid group
for ion conductive polymer membrane used for binder and
fuel cell)
- IT Polysulfones
(polyether-polyketone-, fluorine-containing; crosslinkable aromatic
resin having protonic acid group for ion conductive polymer
membrane used for binder and fuel cell
)
- IT Fluoropolymers
Polysulfones
(polyether-polyketone-; crosslinkable aromatic resin having protonic
acid group for ion conductive polymer membrane used for
binder and fuel cell)
- IT Fluoropolymers
(polyether-polyketone-polysulfone-; crosslinkable aromatic resin
having protonic acid group for ion conductive polymer
membrane used for binder and fuel cell
)
- IT Polyketones
(polyether-polysulfone-, fluorine-containing; crosslinkable aromatic
resin having protonic acid group for ion conductive polymer
membrane used for binder and fuel cell
)
- IT Polyketones
(polyether-polysulfone-; crosslinkable aromatic resin having
protonic acid group for ion conductive polymer membrane
used for binder and fuel cell)
- IT Polyamides
Polyketones
(polyimide-; crosslinkable aromatic resin having protonic acid group
for ion conductive polymer membrane used for binder and
fuel cell)
- IT Polysulfones
(polyimide-polyketone-; crosslinkable aromatic resin having protonic
acid group for ion conductive polymer membrane used for
binder and fuel cell)
- IT Polyketones
(polyimide-polysulfone-; crosslinkable aromatic resin having
protonic acid group for ion conductive polymer membrane
used for binder and fuel cell)
- IT Polyethers
(polyketone-, fluorine-containing; crosslinkable aromatic resin having
protonic acid group for ion conductive polymer membrane
used for binder and fuel cell)
- IT Polyamic acids
Polyamides
Polyethers
Polyimides
(polyketone-; crosslinkable aromatic resin having protonic acid

- group for ion conductive polymer membrane used for binder and fuel cell)
- IT Polyethers
(polyketone-polysulfone-, fluorine-containing; crosslinkable aromatic resin having protonic acid group for ion conductive polymer membrane used for binder and fuel cell
)
- IT Polyamic acids
Polyamides
Polyethers
Polyimides
(polyketone-polysulfone-; crosslinkable aromatic resin having protonic acid group for ion conductive polymer membrane used for binder and fuel cell)
- IT Polyphosphoric acids
(polymers with 3,3'-diamino-4,4-bisphenol dihydrochloride and 4,4'-benzophenonedicarboxylic acid, sulfonated; crosslinkable aromatic resin having protonic acid group for ion conductive polymer membrane used for binder and fuel cell
)
- IT Polyethers
(polyphenyl-; crosslinkable aromatic resin having protonic acid group for ion conductive polymer membrane used for binder and fuel cell)
- IT Polyethers
(polysulfide-; crosslinkable aromatic resin having protonic acid group for ion conductive polymer membrane used for binder and fuel cell)
- IT Polyethers
Polyethers
(polysulfone-; crosslinkable aromatic resin having protonic acid group for ion conductive polymer membrane used for binder and fuel cell)
- IT Crosslinking
(radiochem.; crosslinkable aromatic resin having protonic acid group for ion conductive polymer membrane used for binder and fuel cell)
- IT Crosslinking
(thermal; crosslinkable aromatic resin having protonic acid group for ion conductive polymer membrane used for binder and fuel cell)
- IT 1012870-75-5P
((C₂₉H₁₈N₂O₁₃S₂)_n.2Na; crosslinkable aromatic resin having protonic acid group for ion conductive polymer membrane used for binder and fuel cell)
- IT 10401-11-3DP, reaction products with bisphenol A-dichlorodiphenylsulfone-disodium
3,3'-disulfonate-4,4'-dichlorodiphenyl sulfone copolymer
(Bisphenol A-dichlorodiphenylsulfone-disodium 3,3'-disulfonate-4,4'-dichlorodiphenyl sulfone copolymer; crosslinkable aromatic resin having protonic acid group for ion conductive polymer membrane used for binder and fuel cell)
- IT 31694-16-3DP, PEEK450P, sulfonated
(PEEK450P; crosslinkable aromatic resin having protonic acid group for ion conductive polymer membrane used for binder and fuel cell)
- IT 964-68-1DP, 4,4'-Benzophenonedicarboxylic acid, polymers with 3,3'-diamino-4,4-bisphenol dihydrochloride and polyphosphoric acid, sulfonated

- (Polyphosphoric acid; crosslinkable aromatic resin having protonic acid group for ion conductive polymer ~~membrane~~ used for binder and fuel cell)
- IT 1592-35-4DP, polymers with 4,4'-benzophenonedicarboxylic acid and polyphosphoric acid, sulfonated
(crosslinkable aromatic resin having protonic acid group for ion conductive polymer ~~membrane~~ used for binder and fuel cell)
- IT 25134-01-4P, Poly(2,6-dimethyl-1,4-phenylene oxide) 127546-84-3P
(crosslinkable aromatic resin having protonic acid group for ion conductive polymer ~~membrane~~ used for binder and fuel cell)
- IT 1076-99-9DP, 4-Allylbenzoic acid, reaction products with polyether-polyketone 1745-89-7DP, reaction products with fluoropolymer-polyether-polyketone 10601-99-7DP, 3-Ethynylbenzoic acid, reaction products with fluoropolymer-polyether-polyketone 24938-67-8P, Poly(2,6-dimethyl-1,4-phenylene oxide) 25897-65-8P 28825-50-5P 29658-28-4P 32034-67-6P 39342-71-7DP, Poly(dimethylphenol), reaction products with 2-allylphenol, sulfonated 41205-96-3P 54571-77-6P 87089-64-3P 87781-17-7P 87792-34-5P 127546-84-3DP, sulfonated 127583-87-3P 127669-56-1P 146673-88-3DP, reaction products with 3-ethynylphenol 146673-88-3DP, reaction products with 4-ethynylfluorobenzene 267877-35-0DP, reaction products with 3-ethynylphenol 342047-78-3DP, reaction products with 3-ethynylphenol 342047-78-3P 342047-79-4DP, reaction products with 3-ethynylphenol 342047-79-4P 515144-26-0P 515144-27-1P 515144-28-2P 515144-29-3P 515144-30-6P 515144-31-7P 515144-32-8P 515144-34-0P 515144-35-1P 515144-36-2P 515144-37-3P 515144-38-4P 515144-41-9DP, sulfonated 515144-42-0P 515144-44-2DP, sulfonated 515144-44-2P 515144-45-3DP, sulfonated 515144-45-3P ~~515144-48-6P~~ 515144-49-7P 515144-50-0P 515144-51-1DP, reaction products with 3-ethynylbenzoic acid 515144-51-1P 515144-53-3P 515144-54-4P 515144-55-5P 515144-56-6P 515144-57-7P 515144-58-8P 515144-59-9P 515144-60-2P 515144-61-3P 515144-62-4P 515144-64-6P 515144-65-7P 515144-66-8DP, reaction products with 3-ethynylphenol 515144-67-9P 515144-68-0DP, reaction products with 3-ethynylphenol 515144-69-1DP, reaction products with 3-ethynylphenol 515144-70-4DP, reaction products with 3-ethynylphenol 515144-75-9DP, reaction products with 3-ethynylphenol 515811-98-0P 1012791-98-8P 1012791-99-9P 1012792-00-5P 1012792-01-6P 1012792-05-0P 1012792-07-2P 1012792-14-1DP, sulfonated 1012792-14-1P 1012792-15-2P 1012792-18-5P 1012792-19-6P 1012792-20-9P ~~1012792-22-1DP~~, sulfonated 1012870-75-5DP, sulfonated
(crosslinkable aromatic resin having protonic acid group for ion conductive polymer ~~membrane~~ used for binder and fuel cell)
- IT 51698-33-0P 210531-45-6P, Disodium 3,3'-disulfonate-4,4'-difluorobenzophenone 515144-46-4P
(crosslinkable aromatic resin having protonic acid group for ion conductive polymer ~~membrane~~ used for binder and fuel cell)
- IT 50-00-0, Formaldehyde, reactions 80-05-7, 2,2-Bis(4-hydroxy-phenyl)-propane, reactions 80-07-9, 4,4'-Dichlorodiphenylsulfone 345-92-6, 4,4'-Difluorobenzophenone 598-03-8 766-98-3 1076-99-9, 4-Allylbenzoic acid 1745-89-7 7647-14-5, Sodium chloride, reactions 7757-83-7 10401-11-3, 3-Ethynylphenol 10601-99-7, 3-Ethynylbenzoic acid

(crosslinkable aromatic resin having protonic acid group for ion conductive polymer membrane used for binder and fuel cell)

IT 7664-93-9, Sulfuric acid, reactions 7790-94-5,
Chlorosulfuric acid

(crosslinkable aromatic resin having protonic acid group for ion conductive polymer membrane used for binder and fuel cell)

IT 210531-46-7P

(crosslinked; crosslinkable aromatic resin having protonic acid group for ion conductive polymer membrane used for binder and fuel cell)

IT 515144-39-5P 515144-40-8P

(optionally crosslinked; crosslinkable aromatic resin having protonic acid group for ion conductive polymer membrane used for binder and fuel cell)

IT 515144-71-5P

(polyamic acid; crosslinkable aromatic resin having protonic acid group for ion conductive polymer membrane used for binder and fuel cell)

IT 515144-71-5DP, reaction products with 3-ethynylphenol

(polyamic acid; crosslinkable aromatic resin having protonic acid group for ion conductive polymer membrane used for binder and fuel cell)

IT 515144-24-8P

(uncrosslinked and crosslinked; crosslinkable aromatic resin having protonic acid group for ion conductive polymer membrane used for binder and fuel cell)

RETABLE

Referenced Author	Year	VOL	PG	Referenced Work	
Referenced					

(RAU)	(RPY)	(RVL)	(RPG)	(RWK)	File
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Wang, F	1999		795	Polymer HCA
Yen	1998			US 5795496 A HCA

OS.CITING REF COUNT: 2 THERE ARE 2 CAPLUS RECORDS THAT CITE THIS RECORD (2 CITINGS)

L98 ANSWER 2 OF 21 HCA COPYRIGHT 2010 ACS on STN

ACCESSION NUMBER: 145:66070 HCA Full-text

TITLE: SiO₂/sulfonated PEEK doped with dodecatungstophosphoric acid hybrid materials - preparation and properties

AUTHOR(S): Wu, Han-Lang; Ma, Chen-Chi M.

CORPORATE SOURCE: Department of Chemical Engineering, National Tsing-Hua University, Taiwan

SOURCE: Composites Technologies for 2020, Proceedings of the Asian-Australasian Conference on Composite Materials (ACCM-4), 4th, Sydney, Australia, July 6-9, 2004 (2004), 876-881. Editor(s): Ye, Lin; Mai, Yiu-Wing; Su, Zhongqing. Woodhead Publishing Ltd.: Cambridge, UK.
CODEN: 69HLWP; ISBN: 1-85573-831-7

DOCUMENT TYPE: Conference

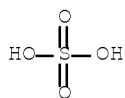
LANGUAGE: English

AB A novel organic/inorg. proton conducting composite ~~membrane~~ based on sulfonated poly (ether ether ketone) (sPEEK) for utilizing in the polymer electrolyte has been prepared. The composite ~~membrane~~ was modified with dodecatungstophosphoric acid (PWA) and colloidal silica (SiO₂). Results show that the longer the sulfonation time, the higher the proton conductivity. However, it may cause over swelling. The modification with PWA shows increasing in the proton conductivity, however, when PWA content is over 40phr, phase separation may occur. PWA leaking problem was found in ~~membrane~~ durability testing, but the modification with SiO₂ will reduce the degree of PWA leaking and the swelling of ~~membranes~~. The degree of methanol crossover was also investigated in this study. Comparing to Nafion ~~membrane~~, sPEEK/PWA organic/inorg. composite ~~membrane~~ possesses almost the same proton conductivity of 0.05 S/cm at room temperature, but has the lower methanol permeability (2×10^{-7} cm²/s). Consequently, the sPEEK/PWA organic/inorg. composite ~~membrane~~ may be suitable for the application of direct methanol fuel cell (DMFC).

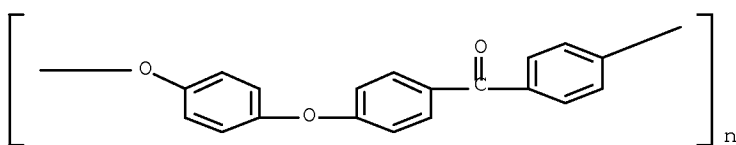
IT 7664-93-9, Sulfuric acid, uses
(SiO₂/sulfonated PEEK doped with dodecatungstophosphoric acid hybrid materials)

RN 7664-93-9 HCA

CN Sulfuric acid (CA INDEX NAME)



IT 31694-16-3D, PEEK 450G, sulfonated
 (SiO2/sulfonated PEEK doped with
 dodecatungstophosphoric acid hybrid materials)
 RN 31694-16-3 HCA
 CN Poly(oxy-1,4-phenyleneoxy-1,4-phenylenecarbonyl-1,4-phenylene) (CA
 INDEX NAME)



CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 Section cross-reference(s): 35, 49
 IT Fuel cell separators
 (direct-methanol, PEM; SiO2/sulfonated PEEK doped with
 dodecatungstophosphoric acid hybrid materials)
 IT 67-56-1, Methanol, uses 872-50-4, NMP, uses 7664-93-9,
 Sulfuric acid, uses
 (SiO2/sulfonated PEEK doped with dodecatungstophosphoric acid
 hybrid materials)
 IT 1343-93-7 7631-86-9, Silica, uses 31694-16-3D, PEEK
 450G, sulfonated
 (SiO2/sulfonated PEEK doped with
 dodecatungstophosphoric acid hybrid materials)

RETABLE

Referenced Author	Year	VOL	PG	Referenced Work	
(RAU)	(RPY)	(RVL)	(RPG)	(RWK)	File
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Chang, J	2003	124	18	J Membrane Science	HCA
Chiang, C	2003			ICCM-14 (Internation	
Honma, I	1999	120	255	Solid State Ionics	HCA
Kreuer, K	2001	185	29	J Membrane Science	HCA
Kuan, H	2003			ICCM-14 (Internation	
Mikhailenko, S	2000	38	1386	J Polymer Science: P	HCA
Ponce, M	2003	217	5	J Membrane Science	HCA
Wilhelm, F	2002	199	167	J Membrane Science	HCA
Zaidi, S	2000	173	17	J Membrane Science	HCA
OS.CITING REF COUNT:	1	THERE ARE 1 CAPLUS RECORDS THAT CITE THIS RECORD (1 CITINGS)			

L98 ANSWER 3 OF 21 HCA COPYRIGHT 2010 ACS on STN
 ACCESSION NUMBER: 144:436093 HCA Full-text

TITLE: Improved proton conducting ~~membrane~~,
process for fabrication and application in a
fuel cell

INVENTOR(S): Glipa, Xavier; Berthelot, Sylvie; Getton,
Frederick; Grasset, Frederic; Jones, Deborah;
Roziere, Jacques

PATENT ASSIGNEE(S): Peugeot Citroen Automobiles SA, Fr.; Centre
National De La Recherche Scientifique Cnrs

SOURCE: Fr. Demande, 33 pp.
CODEN: FRXXBL

DOCUMENT TYPE: Patent

LANGUAGE: French

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

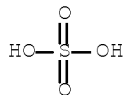
PATENT NO. -----	KIND ----	DATE -----	APPLICATION NO. -----	DATE
FR 2877147	A1	20060428	FR 2004-11284	200410 22
			<--	
FR 2877147	B1	20100903		
PRIORITY APPLN. INFO.:			FR 2004-11284	200410 22
			<--	

AB The invention relates to mainly a protonic conducting ~~membrane~~ including a microporous structure produced starting from a proton conducting polymer and having a sufficient conductivity to ensure only the ionic conduction of the ~~membrane~~. Preferentially, the pores of the microporous structure are at least partially sealed by one or more compds. of a protonic conductivity lower than that of the cited microporous structure. The invention also relates to a manufacturing process of the ~~membrane~~. The invention also relates to the application of such a ~~membrane~~ in an electrochem. device such as a fuel cell as a proton exchange ~~membrane~~ or a polymeric solid electrolyte.

IT ~~7664-93-9~~, Sulfuric acid, processes
(improved proton conducting ~~membrane~~, process for
fabrication and application in fuel cell)

RN 7664-93-9 HCA

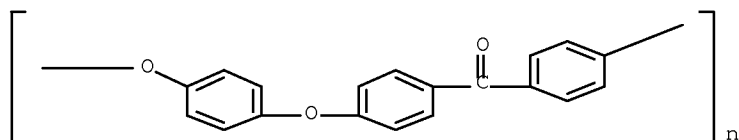
CN Sulfuric acid (CA INDEX NAME)



IT ~~31694-16-3DP~~, PEEK, sulfonated
(improved proton conducting ~~membrane~~, process for
fabrication and application in fuel cell)

RN 31694-16-3 HCA

CN Poly(oxy-1,4-phenyleneoxy-1,4-phenylenecarbonyl-1,4-phenylene) (CA
INDEX NAME)



(plain and composites with zirconium phosphate; improved proton conducting membrane, process for fabrication and application in fuel cell

- IPCI H01M0008-10 [I,A]; H01M0004-86 [I,A]; H01M0008-10 [I,C]; H01M0008-10 [I,A]; H01M0004-86 [I,C]; H01M0004-86 [I,A]
- IPCR H01M0008-10 [I,C]; H01M0008-10 [I,A]; H01M0004-86 [I,C]; H01M0004-86 [I,A]
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 36, 38
- ST proton conducting membrane fabrication fuel cell separator electrolyte polyelectrolyte; mineral pore filling proton exchange membrane sulfonated polyether polyketone
- IT Solvents
(antisolvents, to induce precipitation; improved proton conducting membrane, process for fabrication and application in fuel cell)
- IT Polymers, uses
(aromatic, composites with minerals; improved proton conducting membrane, process for fabrication and application in fuel cell)
- IT Polymers, uses
(carboxy-containing, composites with minerals; improved proton conducting membrane, process for fabrication and application in fuel cell)
- IT Membranes, nonbiological
(composite; improved proton conducting membrane, process for fabrication and application in fuel cell)
- IT Polybenzimidazoles
Polysulfones, uses
(composites with minerals; improved proton conducting membrane, process for fabrication and application in fuel cell)
- IT Heteropoly acids
Oxides (inorganic), uses
Phosphates, uses
Phosphonates
(composites with proton exchange membranes; improved proton conducting membrane, process for fabrication and application in fuel cell)
- IT Membranes, nonbiological
(elec. conductive; improved proton conducting membrane, process for fabrication and application in fuel cell)
- IT Electric conductivity
Fuel cell electrolytes
Fuel cell separators
Ion exchange
Ion exchange membranes
Polyelectrolytes

Precipitation (chemical)

Sulfonation

(improved proton conducting membrane, process for fabrication and application in fuel cell)

IT Pore

(micropore; improved proton conducting membrane, process for fabrication and application in fuel cell)

IT Microstructure

(of ion exchange membrane; improved proton conducting membrane, process for fabrication and application in fuel cell)

IT Functional groups

(phosphonate group, composites with minerals; improved proton conducting membrane, process for fabrication and application in fuel cell)

IT Polyketones

Polysulfones, uses

(polyether-, composites with minerals; improved proton conducting membrane, process for fabrication and application in fuel cell)

IT Polyketones

(polyether-, sulfonated, composites with minerals; improved proton conducting membrane, process for fabrication and application in fuel cell)

IT Polyketones

(polyether-, sulfonation of; improved proton conducting membrane, process for fabrication and application in fuel cell)

IT Polyethers, uses

(polyketone-, composites with minerals; improved proton conducting membrane, process for fabrication and application in fuel cell)

IT Polyethers, uses

(polyketone-, sulfonated, composites with minerals; improved proton conducting membrane, process for fabrication and application in fuel cell)

IT Polyethers, processes

(polyketone-, sulfonation of; improved proton conducting membrane, process for fabrication and application in fuel cell)

IT Sulfonic acids, uses

(polymers, composites with minerals; improved proton conducting membrane, process for fabrication and application in fuel cell)

IT Polyethers, uses

(polysulfone-, composites with minerals; improved proton conducting membrane, process for fabrication and application in fuel cell)

IT Ionic conductivity

(proton; improved proton conducting membrane, process for fabrication and application in fuel cell)

IT Polymers, uses

(sulfo-containing, composites with minerals; improved proton conducting membrane, process for fabrication and application in fuel cell)

IT Polymers, uses

(sulfonated, composites with minerals; improved proton conducting membrane, process for fabrication and application in fuel cell)

- IT 1303-86-2, Boron oxide, uses 1314-23-4, Zirconium oxide, uses 1332-29-2, Tin oxide 7631-86-9, Silicon oxide, uses 13463-67-7, Titanium oxide, uses 13765-94-1 14417-93-7, Tin phosphate 21006-68-8 53547-40-3 71851-97-3
(composites with proton exchange membranes; improved proton conducting membrane, process for fabrication and application in fuel cell)
- IT 9003-39-8DP, Polyvinylpyrrolidone, salts with sulfonated PEEK (d.p. 95.1, plain and composites with zirconium phosphate; improved proton conducting membrane, process for fabrication and application in fuel cell)
- IT 9003-39-8, Polyvinylpyrrolidone (d.p. 95.1; improved proton conducting membrane, process for fabrication and application in fuel cell)
- IT 7664-93-9, Sulfuric acid, processes (improved proton conducting membrane, process for fabrication and application in fuel cell)
- IT 31694-16-3, PEEK (improved proton conducting membrane, process for fabrication and application in fuel cell)
- IT 31694-16-3DP, PEEK, sulfonated (improved proton conducting membrane, process for fabrication and application in fuel cell)
- IT 64-17-5, Ethanol, uses (improved proton conducting membrane, process for fabrication and application in fuel cell)
- IT 7732-18-5, Water, uses (improved proton conducting membrane, process for fabrication and application in fuel cell)
- IT 7664-38-2, Phosphoric acid, reactions 7699-43-6, Zirconyl chloride 68926-31-8 (improved proton conducting membrane, process for fabrication and application in fuel cell)
- IT 13765-95-2P, Zirconium phosphate (in membrane pores; improved proton conducting membrane, process for fabrication and application in fuel cell)
- IT 31694-16-3DP, PEEK, sulfonated, salts with polyvinylpyrrolidone (plain and composites with zirconium phosphate; improved proton conducting membrane, process for fabrication and application in fuel cell)

RETABLE

Referenced Author	Year	VOL	PG	Referenced Work	
Referenced					
(RAU)	(RPY)	(RVL)	(RPG)	(RWK)	File
=====	+	=====	+	=====	+
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Zhang, S	2004	125	114	JOURNAL OF POWER SOURCES	HCA
OS.CITING REF COUNT:	1			THERE ARE 1 CAPLUS RECORDS THAT CITE THIS	
				RECORD (1 CITINGS)	

L98 ANSWER 4 OF 21 HCA COPYRIGHT 2010 ACS on STN

ACCESSION NUMBER: 144:72106 HCA Full-textTITLE: Covalently cross-linked ionomer (blend)
membranes for fuel
cells

AUTHOR(S): Kerres, Jochen; Zhang, Wei; Haering, Thomas

CORPORATE SOURCE: Institute for Chemical Engineering, University
of Stuttgart, Stuttgart, D-70199, GermanySOURCE: Journal of New Materials for Electrochemical
Systems (2004), 7(4), 299-309

CODEN: JMESFQ; ISSN: 1480-2422

PUBLISHER: Journal of New Materials for Electrochemical
Systems

DOCUMENT TYPE: Journal

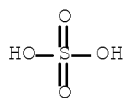
LANGUAGE: English

AB In this contribution the synthesis and characterization of novel types of covalently cross-linked blend membranes is reported. The membranes are composed of different types of sulfochlorinated poly(etherketones) and sulfinated polyethersulfone or polyetherketone arylpolymers, where the sulfinate groups were cross-linked by S-alkylation reactions with bifunctional halogeno-compds., among them α,ω -diiodoalkanes or aromatic difluoro-compds. like bis(4-fluorophenyl)sulfone, bis(3-nitro-4 fluorophenyl)sulfone or bis(4-fluorophenyl)phenylphosphin oxide. After membrane formation the sulfochloride groups of the membranes were hydrolyzed by aqueous posttreatment. Transparent, morphol. homogeneous, mech. stable and highly H⁺-conductive ionomer membranes were obtained. To investigate the influence of different parameters onto the membrane properties, the type and the ion-exchange capacity (IEC) of sulfonated polyetherketone, the type of sulfinated polymer, the mass relation between the sulfonated polyetherketone and the sulfinated polymer, the type of cross-linker, and the crosslinking d. of the membranes has been varied systematically. The results of this work are presented in this contribution.

IT 7664-93-9, Sulfuric acid, uses
(covalently crosslinked ionomer (blend) membranes for
fuel cells)

RN 7664-93-9 HCA

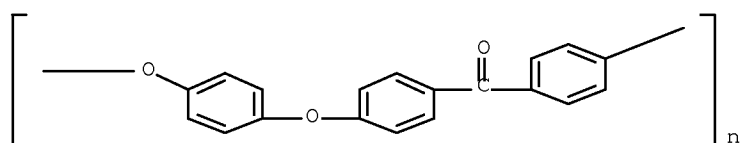
CN Sulfuric acid (CA INDEX NAME)



IT 31694-16-3D, PEEK, chlorosulfonated, hydrolyzed,
lithium salts, polymers
(crosslinked; covalently crosslinked ionomer (blend)
membranes for fuel cells)

RN 31694-16-3 HCA

CN Poly(oxy-1,4-phenyleneoxy-1,4-phenylenecarbonyl-1,4-phenylene) (CA
INDEX NAME)



- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 Section cross-reference(s): 37, 38
- ST ionomer membrane crosslinking fuel cell
- IT Fuel cells
 (PE; covalently crosslinked ionomer (blend) membranes for fuel cells)
- IT Swelling, physical
 Thermal stability
 (covalently crosslinked ionomer (blend) membranes for fuel cells)
- IT Ionomers
 Polymer blends
 (covalently crosslinked ionomer (blend) membranes for fuel cells)
- IT Alkanes, uses
 (diiodo-; covalently crosslinked ionomer (blend) membranes for fuel cells)
- IT Aromatic compounds
 (fluoro arenes; covalently crosslinked ionomer (blend) membranes for fuel cells)
- IT Polysulfones, uses
 (polyether-, sulfinated, crosslinked; covalently crosslinked ionomer (blend) membranes for fuel cells)
- IT Polyketones
 (polyether-, sulfochlorinated, sulfonated, crosslinked; covalently crosslinked ionomer (blend) membranes for fuel cells)
- IT Polyethers, uses
 (polyketone-, sulfochlorinated, sulfonated, crosslinked; covalently crosslinked ionomer (blend) membranes for fuel cells)
- IT Polyethers, uses
 (polysulfone-, sulfinated, crosslinked; covalently crosslinked ionomer (blend) membranes for fuel cells)
- IT 68-12-2, DMF, uses 109-99-9, THF, uses 872-50-4, NMP, uses 1310-65-2, Lithium hydroxide 7664-93-9, Sulfuric acid, uses 7681-52-9, Sodium hypochlorite 7719-09-7, Thionyl chloride 7757-83-7, Sodium sulfite 7772-98-7, Sodium thiosulfate 8014-95-7, Oleum 25135-51-7D, sulfinated, hydrolyzed, salts, polymers
 (covalently crosslinked ionomer (blend) membranes for fuel cells)
- IT 31694-16-3, PEEK
 (covalently crosslinked ionomer (blend) membranes for fuel cells)
- IT 25839-81-0D, sulfinated, salts, polymers 27380-27-4D, PEK, chlorosulfonated, hydrolyzed, lithium salts, polymers 60015-05-6D, Pekekk, chlorosulfonated, hydrolyzed, lithium salts, polymers 154281-38-6D, Radel R, sulfinated, salts, polymers

(crosslinked; covalently crosslinked ionomer (blend)
 membranes for fuel cells)
 IT 31694-16-3D, PEEK, chlorosulfonated, hydrolyzed,
 lithium salts, polymers
 (crosslinked; covalently crosslinked ionomer (blend)
 membranes for fuel cells)
 IT 312-30-1 383-29-9, Bis(4-fluorophenyl)sulfone 628-21-7,
 1,4-Diiodobutane 54300-32-2, Bis(4-fluorophenyl)phenylphosphine
 oxide
 (crosslinking agent; covalently crosslinked ionomer (blend)
 membranes for fuel cells)

RETABLE

Referenced Author	Year	VOL	PG	Referenced Work	
Referenced					
(RAU)	(RPY)	(RVL)	(RPG)	(RWK)	File
=====	+	=====	+	=====	+
=====		=====		=====	
Guiver, M	1987			Diss, Carletown Univ	
Karlsson, L	2003			Diss, Lund Universit	
Kerres, J	1997			DE 19622337	HCA
Kerres, J	2001			WO 03/022892 A2	HCA
Kerres, J	2001			US 6221923	HCA
Kerres, J	2003			US 6552135	HCA
Kerres, J	1997			F 9706706	
Kerres, J	1998	139	227	J Memb Sci	HCA
Kerres, J	2001	185	3	J Memb Sci	HCA
Kerres, J	2000	3	229	J New Mat Electroche	HCA
Kerres, J	2002	5	97	J New Mat Electroche	HCA
Kerres, J	1998	36	1441	J Polym Sci: Part A:	HCA
Lindberg, B	1967	21	841	Acta Chem Scand	HCA
Okuyama, T	1990		623	The Chemistry of Sul	HCA
Okuyama, T	1990		639	The Chemistry of Sul	HCA
Sato, M	1982	3	821	Makromol Chem Rapid	HCA
Ulman, A	1989	54	4691	J Org Chem	HCA
Ulrich, H	1998	263	71	Angew Makromol Chem	HCA
OS.CITING REF COUNT:	8			THERE ARE 8 CAPLUS RECORDS THAT CITE THIS	
				RECORD (8 CITINGS)	

L98 ANSWER 5 OF 21 HCA COPYRIGHT 2010 ACS on STN

ACCESSION NUMBER: 144:54217 HCA Full-text

TITLE: Preparation and characterization of ionically cross-linked proton-conducting membranes

AUTHOR(S): Tang, C. M.; Zhang, W.; Kerres, J.

CORPORATE SOURCE: Institute for Chemical Engineering, University of Stuttgart, Stuttgart, D-70199, Germany

SOURCE: Journal of New Materials for Electrochemical Systems (2004), 7(4), 287-298
 CODEN: JMESFQ; ISSN: 1480-2422

PUBLISHER: Journal of New Materials for Electrochemical Systems

DOCUMENT TYPE: Journal

LANGUAGE: English

AB In the presented work, sulfonated arylene polymers were combined with different types of aminated arylene polymers to acid-base ionomer blend membranes. The bases have been synthesized by amination of com. PSU and PEEK. Due to the PSU structure having electron-rich and electron-deficient moieties, the amino group introduction results in two aminated PSU with different properties. Amination of PEEK yields PEEKNH₂. In order to increase the basicity, methylation of the amino groups has been carried out. The sulfonated polymers have been combined with the basic polymers, forming acid-

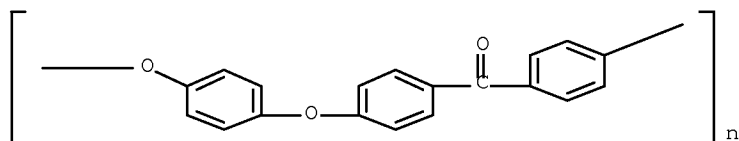
base-blend membranes, in which ionic interactions and/or hydrogen bridges were formed between the polymers. The blend membranes showed properties being dependent onto basic group-basicity and alkylation degree of the basic group: when combining a sulfonated polymer with a weak PSU base which was aminated in the electron-deficient moiety, an ion-exchange capacity (IEC) of higher than calculated was observed, leading to membranes with high swelling at elevated T. When combining the sulfonated polymer with a stronger polymeric base, a good accordance was found between theor. and exptl. IEC. The combination of the sulfonated polymers with alkylated polymeric bases led to phase-separated membranes with bad mech. properties, which is probably due to incompatibility between the two polymers because of steric hindrance of the alkylated base. When testing the membranes in a H₂/O₂ fuel cell, it came out that only the membranes containing the stronger basic PSU were stable up to 80°C due to sufficient ionic interaction between the blend components of this membrane type.

IT 31694-16-3, PEEK

(amination or sulfonation of; preparation/characterization of ionically crosslinked proton-conducting membranes)

RN 31694-16-3 HCA

CN Poly(oxy-1,4-phenyleneoxy-1,4-phenylenecarbonyl-1,4-phenylene) (CA INDEX NAME)

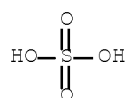


IT 7664-93-9, Sulfuric acid, uses

(preparation/characterization of ionically crosslinked proton-conducting membranes)

RN 7664-93-9 HCA

CN Sulfuric acid (CA INDEX NAME)

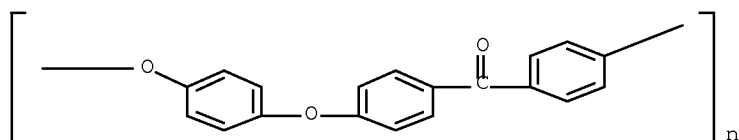


IT 31694-16-3D, PEEK, aminated and sulfonated, salts

(preparation/characterization of ionically crosslinked proton-conducting membranes)

RN 31694-16-3 HCA

CN Poly(oxy-1,4-phenyleneoxy-1,4-phenylenecarbonyl-1,4-phenylene) (CA INDEX NAME)



CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 Section cross-reference(s): 35

ST ionic crosslinking proton conducting membrane fuel cell

IT Fuel cells
 (PE; preparation/characterization of ionically crosslinked proton-conducting membranes)

IT Polyketones
 Polysulfones, uses
 (polyether-, aminated, sulfonated, salts; preparation/characterization of ionically crosslinked proton-conducting membranes)

IT Polyethers, uses
 (polyketone-, aminated, sulfonated, salts; preparation/characterization of ionically crosslinked proton-conducting membranes)

IT Polyethers, uses
 (polysulfone-, aminated, sulfonated, salts; preparation/characterization of ionically crosslinked proton-conducting membranes)

IT Ion exchangers
 Swelling, physical
 Thermal stability
 (preparation/characterization of ionically crosslinked proton-conducting membranes)

IT Polymer blends
 (preparation/characterization of ionically crosslinked proton-conducting membranes)

IT 25135-51-7, Udel P 1800 31694-16-3, PEEK
 (amination or sulfonation of; preparation/characterization of ionically crosslinked proton-conducting membranes)

IT 68-12-2, DMF, uses 74-88-4, Methyl iodide, uses 109-72-8, n-Butyl lithium, uses 109-99-9, THF, uses 121-44-8, Triethylamine, uses 127-19-5 872-50-4, NMP, uses 941-55-9, Tosylazide 1310-58-3, Potassium hydroxide, uses 1333-74-0, Hydrogen, uses 7440-37-1, Argon, uses 7664-93-9, Sulfuric acid, uses 7697-37-2, Nitric acid, uses 7772-98-7, Sodium thiosulfate 7782-44-7, Oxygen, uses 7791-25-5, Sulfonyl chloride 16940-66-2, Sodium borohydride
 (preparation/characterization of ionically crosslinked proton-conducting membranes)

IT 25135-51-7D, Udel P 1800, aminated and sulfonated, salts 31694-16-3D, PEEK, aminated and sulfonated, salts
 (preparation/characterization of ionically crosslinked proton-conducting membranes)

RETABLE

Referenced Author	Year	VOL	PG	Referenced Work	
(RAU)	(RPY)	(RVL)	(RPG)	(RWK)	File
=====	+	+	+	+	+
==					
Arnold, C	1987	38	71	J Membr Sci	
Gunther, H	1992			NMR-spektroskopie, 3	
Hesse, M	1991			Spektroskopische Met	
Hummel/Scholl	1988	2		Atlas of Polymer and	
Jin, X	1985	17	4	Br Polym J	HCA
Kerres, J	1998	139	211	J Membr Sci	HCA
Kerres, J	1996	34	2421	J Polym Sci, Part A	HCA
Kerres, J	1998	36	1441	J Polymer Sci: Part	HCA

Kerres, J	1998	14	145	Sep and Purification
Kesting, R	1985			Synthetic Polymeric
Nabe, A	1997	133	57	J Membr Sci
Nolte, R	1993	83	211	J Membr Sci HCA
Noshay, A	1976	20	1885	J Appl Polym Sci HCA
Pozniak, G	1995	233	23	Die Angew Makr Chem HCA
Seymour, R	1984			Structure-Property R

OS.CITING REF COUNT: 6 THERE ARE 6 CAPLUS RECORDS THAT CITE THIS RECORD (6 CITINGS)

L98 ANSWER 6 OF 21 HCA COPYRIGHT 2010 ACS on STN
 ACCESSION NUMBER: 142:300971 HCA Full-text
 TITLE: Ion exchange composite material based on proton
 conductive functionalized inorganic support
 compounds in a polymer matrix
 INVENTOR(S): St.-Arnaud, Marc; Bebin, Philippe
 PATENT ASSIGNEE(S): Can.
 SOURCE: U.S. Pat. Appl. Publ., 20 pp., Cont.-in-part of
 Appl. No. PCT/CA03/00435.
 CODEN: USXXCO
 DOCUMENT TYPE: Patent
 LANGUAGE: English
 FAMILY ACC. NUM. COUNT: 2
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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US 20050053818	A1	20050310	US 2004-949022	200409 24
			<--	
WO 2003083985	A2	20031009	WO 2003-CA435	200303 26
			<--	
WO 2003083985	A3	20041216		
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW				
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
CA 2494430	A1	20060324	CA 2005-2494430	200501 26
			<--	
EP 1646097	A2	20060412	EP 2005-20419	200509 20
			<--	
EP 1646097	A3	20081001		
EP 1646097	B1	20100804		
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC,				

PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU,
PL, SK, BA, HR, IS, YU

AT 476761

T

20100815

AT 2005-20419

200509

20

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PRIORITY APPLN. INFO.:

US 2002-367771P

P

200203

28

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WO 2003-CA435

A2

200303

26

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US 2004-949022

A

200409

24

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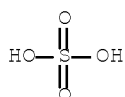
AB The composite material comprises acid functionalized inorg. supports such as silica dispersed in a functionalized and/or non-functionalized polymer matrix that is based on numerous polymers such as poly(aromatic ether ketones), or poly(benzoyl phenylene), or derivs. thereof. The composite material is characterized by good water retention capabilities due to the acidic functions and the hydrophilicity of the silica particles. Moreover, a good impermeability to gas and liquid fuels commonly used in fuel cell technol., like hydrogen gas or methanol solution, is also obtained due to the presence of silica particles. Good mech. properties of the composite material let the material to be formed easily in thin film or membrane form. In that form, the composite material is usable for proton exchange membrane for fuel cells, for drying or humidifying membrane for gas or solvent conditioning, or as acid catalytic membrane.

IT 7664-93-9, Sulfuric acid, processes

(ion exchange composite material based on proton conductive
functionalized inorg. support compds. in polymer matrix)

RN 7664-93-9 HCA

CN Sulfuric acid (CA INDEX NAME)

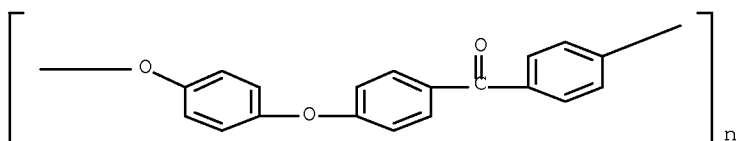


IT 31694-16-3D, PEEK, sulfonated

(ion exchange composite material based on proton conductive
functionalized inorg. support compds. in polymer matrix)

RN 31694-16-3 HCA

CN Poly(oxy-1,4-phenyleneoxy-1,4-phenylenecarbonyl-1,4-phenylene) (CA
INDEX NAME)



INCL 429030000; 429033000; 429046000; 204296000; 429044000; 429041000
 IPCI H01M0008-10 [ICM,7]; H01M0004-86 [ICS,7]; H01M0004-90 [ICS,7];
 H01M0004-96 [ICS,7]; H01M0008-08 [ICS,7]; H01M0008-14 [ICS,7];
 C25B0013-00 [ICS,7]; C25C0007-04 [ICS,7]; C25C0007-00 [ICS,7,C*]
 IPCR C25B0013-00 [I,C*]; C25B0013-00 [I,A]; C25C0007-00 [I,C*];
 C25C0007-04 [I,A]; H01M0004-86 [I,C*]; H01M0004-86 [I,A];
 H01M0004-90 [I,C*]; H01M0004-90 [I,A]; H01M0004-96 [I,C*];
 H01M0004-96 [I,A]; H01M0008-08 [I,C*]; H01M0008-08 [I,A];
 H01M0008-10 [I,C*]; H01M0008-10 [I,A]; H01M0008-14 [I,C*];
 H01M0008-14 [I,A]
 NCL 429/431.000; 204/296.000; 429/493.000; 429/516.000
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 Section cross-reference(s): 38, 48, 56, 61, 72
 ST fuel cell composite inorg compd polymer matrix
 IT Membranes, nonbiological
 (catalytic, acid; ion exchange composite material based on proton
 conductive functionalized inorg. support compds. in polymer
 matrix)
 IT Membranes, nonbiological
 (desalination; ion exchange composite material based on proton
 conductive functionalized inorg. support compds. in polymer
 matrix)
 IT Air conditioning
 Composites
 Ion exchangers
 Liquid crystals, polymeric
 Sulfonation
 (ion exchange composite material based on proton conductive
 functionalized inorg. support compds. in polymer matrix)
 IT Separation
 (membranes; ion exchange composite material based on
 proton conductive functionalized inorg. support compds. in
 polymer matrix)
 IT Fuel cells
 (proton exchange membrane; ion exchange composite
 material based on proton conductive functionalized inorg. support
 compds. in polymer matrix)
 IT 110-86-1, Pyridine, processes 302-04-5, Thiocyanate, processes
 420-04-2, Cyanamide 661-20-1, Isocyanate 7664-38-2, Phosphoric
 acid, processes 7664-93-9, Sulfuric acid, processes
 7803-51-2, Phosphine 13598-36-2, Phosphonic acid 13840-40-9,
 Phosphine oxide 14265-44-2, Phosphate, processes 15477-76-6,
 Phosphonate 32323-01-6, Imide
 (ion exchange composite material based on proton conductive
 functionalized inorg. support compds. in polymer matrix)
 IT 1314-23-4, Zirconium oxide, uses 1344-28-1, Alumina, uses
 7631-86-9D, Silica, acid functionalized 7631-86-9D, Silica,
 carboxylic acid functionalized 7631-86-9D, Silica, phosphonic acid
 functionalized 7631-86-9D, Silica, propylamine-functionalized
 7631-86-9D, Silica, sulfonic acid functionalized 9002-84-0, Ptfе
 9002-86-2, Polyvinyl chloride 9002-88-4, Polyethylene 9003-07-0,
 Polypropylene 9003-53-6, Polystyrene 9003-56-9,
 Acrylonitrile-butadiene-styrene copolymer 9004-34-6, Cellulose,
 uses 13463-67-7, Titanium oxide, uses 24937-78-8, Ethylene-vinyl
 acetate copolymer 31694-16-3, Peek 31694-16-3D, PEEK,
 sulfonated 52352-27-9 150385-13-0,
 Poly(benzoyl-1,4-phenylene) 223537-84-6
 (ion exchange composite material based on proton conductive

functionalized inorg. support compds. in polymer matrix)
OS.CITING REF COUNT: 3 THERE ARE 3 CAPLUS RECORDS THAT CITE THIS
RECORD (3 CITINGS)

L98 ANSWER 7 OF 21 HCA COPYRIGHT 2010 ACS on STN

ACCESSION NUMBER: 142:41476 HCA Full-text

TITLE: Aromatic sulfonate ester derivatives,
polyarylenes, sulfo-containing polyarylenes and
their manufacture, and polymer solid
electrolytes and proton-conducting
membranes for fuel
cells

INVENTOR(S): Yamakawa, Yoshitaka; Kadota, Toshiaki; Rojanski,
Igor; Goto, Kohei

PATENT ASSIGNEE(S): JSR Ltd., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 29 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO. -----	KIND ----	DATE -----	APPLICATION NO. -----	DATE
JP 2004346163	A	20041209	JP 2003-143904	200305 21
			<--	
JP 4193581	B2	20081210		
PRIORITY APPLN. INFO.:			JP 2003-143904	200305 21
			<--	

OTHER SOURCE(S): MARPAT 142:41476

AB The ester derivs. are represented by $C_6X_2H_3A(C_6H_4B)_m[C_6(SO_3Ra)_kH_4-k]_nAr$ [X = halo excluding F, OSO₃Me, OSO₃CF₃; A = divalent organic; B = A, direct bond; Ra = C₄-20 hydrocarbyl; Ar = SO₃Rb (Rb = Ra)-substituted aromatic; when n = 0, Ar = Ph; m, n = 0-10; m + n ≥ 1; k = 1-4]. The polyarylenes have aromatic repeating units including X-free residues of the above derivs. The sulfo-containing polyarylenes are manufactured by coupling-polymerization of aromatic compds. containing the ester derivs. and hydrolysis of the resulting polyarylenes. The electrolytes are made of the sulfo-containing polyarylenes and contained in the title membranes. Sulfonating agents are not used in manufacture of the sulfo-containing polyarylenes to reduce load in recovering the polymers, and introduction amount and position of sulfo group in the polymers are easily controlled.

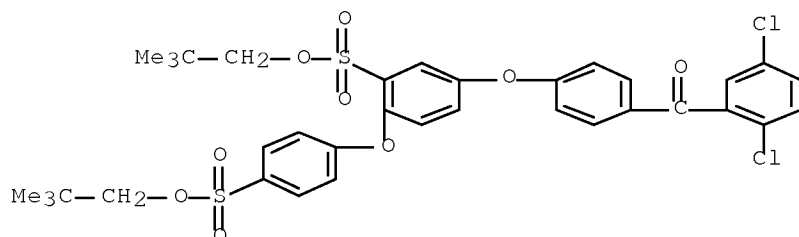
IT 663920-37-4P

(aromatic sulfonate ester derivs. forming polyarylenes
used in manufacture of sulfo-containing polyarylenes for polymer solid
electrolytes and proton-conducting membranes for
fuel cells)

RN 663920-37-4 HCA

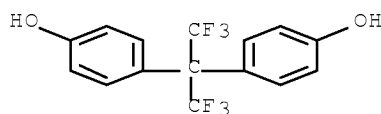
CN Benzenesulfonic acid, 5-[4-(2,5-dichlorobenzoyl)phenoxy]-2-[4-[(2,2-dimethylpropoxy)sulfonyl]phenoxy]-, 2,2-dimethylpropyl ester, polymer with bis(4-chlorophenyl)methanone and 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethyldiene]bis[phenol] (9CI) (CA INDEX NAME)

CRN 663920-36-3
CMF C35 H36 Cl2 O9 S2



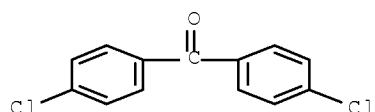
CM 2

CRN 1478-61-1
CMF C15 H10 F6 O2



CM 3

CRN 90-98-2
CMF C13 H8 Cl2 O



IT 663920-37-4DP, hydrolyzed
(aromatic sulfonate ester derivs. forming polyarylenes
used in manufacture of sulfo-containing polyarylenes for polymer solid
electrolytes and proton-conducting membranes for
fuel cells)

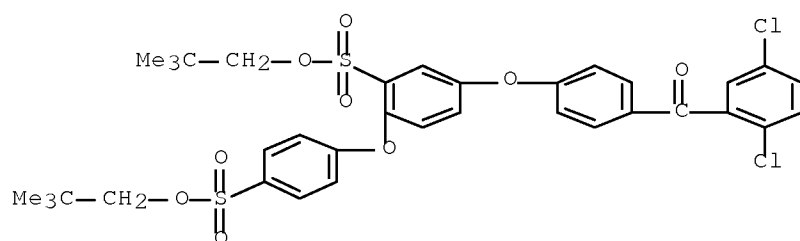
RN 663920-37-4 HCA

CN Benzenesulfonic acid, 5-[4-(2,5-dichlorobenzoyl)phenoxy]-2-[4-[(2,2-dimethylpropoxy)sulfonyl]phenoxy]-, 2,2-dimethylpropyl ester,
polymer with bis(4-chlorophenyl)methanone and
4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethyldiene]bis[phenol]
(9CI) (CA INDEX NAME)

CM 1

CRN 663920-36-3

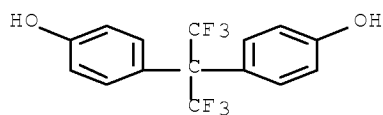
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CM 2

CRN 1478-61-1

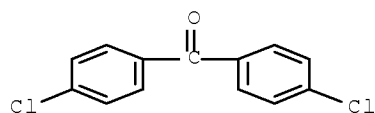
CMF C15 H10 F6 O2



CM 3

CRN 90-98-2

CMF C13 H8 C12 O

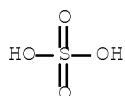


IT 7664-93-9D, Sulfuric acid, sulfonate derivs.

(aromatic sulfonate ester derivs. forming polyarylenes used in manufacture of sulfo-containing polyarylenes for polymer solid electrolytes and proton-conducting membranes for fuel cells)

RN 7664-93-9 HCA

CN Sulfuric acid (CA INDEX NAME)



- IPCI C08G0061-10 [I,A]; C08G0061-00 [I,C*]; C07C0309-75 [I,A];
C07C0309-00 [I,C*]; H01M0008-02 [I,A]; H01M0008-10 [I,A]
- IPCR C07C0309-00 [I,C*]; C07C0309-75 [I,A]; C08G0061-00 [I,C*];
C08G0061-10 [I,A]; H01M0008-02 [I,A]; H01M0008-02 [I,C*];
H01M0008-10 [I,A]; H01M0008-10 [I,C*]
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 37, 38
- ST fuel cell proton conducting membrane
polymer electrolyte; arom sulfonate ester deriv sulfo polyarylene
manuf; sulfo polyarylene manuf polymer electrolyte fuel
cell
- IT Fuel cell electrolytes
Ionic conductors
Polymer electrolytes
(aromatic sulfonate ester derivs. forming polyarylenes used in
manufacture of sulfo-containing polyarylenes for polymer solid
electrolytes and proton-conducting membranes for
fuel cells)
- IT Sulfonic acids, preparation
(esters, derivs.; aromatic sulfonate ester derivs. forming
polyarylenes used in manufacture of sulfo-containing polyarylenes for
polymer solid electrolytes and proton-conducting
membranes for fuel cells)
- IT Polyketones
(polyether-, fluorine-containing, polyarylene-, sulfo-containing; aromatic
sulfonate ester derivs. forming polyarylenes used in manufacture of
sulfo-containing polyarylenes for polymer solid electrolytes and
proton-conducting membranes for fuel
cells)
- IT Fluoropolymers, uses
(polyether-polyketone-, polyarylene-, sulfo-containing; aromatic
sulfonate ester derivs. forming polyarylenes used in manufacture of
sulfo-containing polyarylenes for polymer solid electrolytes and
proton-conducting membranes for fuel
cells)
- IT Polyethers, uses
(polyketone-, fluorine-containing, polyarylene-, sulfo-containing; aromatic
sulfonate ester derivs. forming polyarylenes used in manufacture of
sulfo-containing polyarylenes for polymer solid electrolytes and
proton-conducting membranes for fuel
cells)
- IT Hydrolysis
(sulfo-containing polyarylenes manufactured by; aromatic sulfonate ester
derivs. forming polyarylenes used in manufacture of sulfo-containing
polyarylenes for polymer solid electrolytes and proton-conducting
membranes for fuel cells)
- IT 663920-34-1DP, sulfonate derivs. 663920-35-2DP, sulfonate derivs.
663920-37-4P 803733-72-4DP, sulfonate derivs.
(aromatic sulfonate ester derivs. forming polyarylenes
used in manufacture of sulfo-containing polyarylenes for polymer solid
electrolytes and proton-conducting membranes for
fuel cells)
- IT 663920-37-4DP, hydrolyzed
(aromatic sulfonate ester derivs. forming polyarylenes
used in manufacture of sulfo-containing polyarylenes for polymer solid
electrolytes and proton-conducting membranes for
fuel cells)
- IT 75-84-3D, Neopentyl alcohol, sulfonate derivs. 831-82-3D,
4-Phenoxyphenol, sulfonate derivs. 1310-58-3D, Potassium
hydroxide, sulfonate derivs. 7664-93-9D, Sulfuric acid,

sulfonate derivs. 10025-87-3D, Phosphoryl chloride, sulfonate derivs. 270903-87-2D, 2,5-Dichloro-4'-fluorobenzophenone, sulfonate derivs.

(aromatic sulfonate ester derivs. forming polyarylenes used in manufacture of sulfo-containing polyarylenes for polymer solid electrolytes and proton-conducting ~~membranes~~ for fuel cells)

IT 663920-36-3P

(monomer; aromatic sulfonate ester derivs. forming polyarylenes used in manufacture of sulfo-containing polyarylenes for polymer solid electrolytes and proton-conducting ~~membranes~~ for fuel cells)

OS.CITING REF COUNT: 1 THERE ARE 1 CAPLUS RECORDS THAT CITE THIS RECORD (1 CITINGS)

L98 ANSWER 8 OF 21 HCA COPYRIGHT 2010 ACS on STN

ACCESSION NUMBER: 142:41311 HCA Full-text

TITLE: Synthesis and characterization of hydroquinone based disulfonated poly (arylene ether sulfone)s via direct copolymerization

AUTHOR(S): Roy, Abhishek; Einsla, Brian R.; Harrison, William L.; McGrath, James E.

CORPORATE SOURCE: Department of Chemistry, Virginia Polytechnic Institute and State University, Blacksburg, VA, 24061, USA

SOURCE: Preprints of Symposia - American Chemical Society, Division of Fuel Chemistry (2004), 49(2), 614-615

CODEN: PSADFZ; ISSN: 1521-4648

PUBLISHER: American Chemical Society, Division of Fuel Chemistry

DOCUMENT TYPE: Journal; (computer optical disk)

LANGUAGE: English

AB The authors report the synthesis of sulfonated poly(arylene ether sulfone)S based on bisphenol and hydroquinone and related systems by direct copolymn. with a sulfonated monomer. The ion exchange capacity, intrinsic viscosity, water sorption capacity, and proton conductivity increase with the degree of sulfonation. The salt form of the copolymers have increased thermo-oxidative stability relative to the acid form, and this stability decreases with sulfonation level.

IT 515144-67-9DP, proton exchanged

(synthesis and characterization of hydroquinone based disulfonated poly (arylene ether sulfone)s via direct copolymn.)

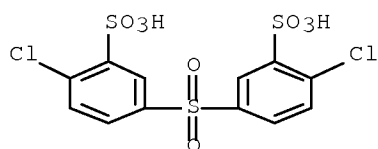
RN 515144-67-9 HCA

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, sodium salt (1:2), polymer with 1,4-benzenediol and 1,1'-sulfonylbis[4-chlorobenzene] (CA INDEX NAME)

CM 1

CRN 51698-33-0

CMF C12 H8 C12 O8 S3 . 2 Na

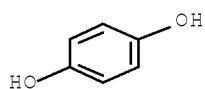


●2 Na

CM 2

CRN 123-31-9

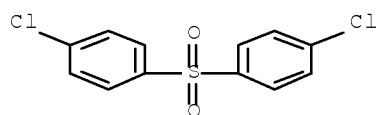
CMF C6 H6 O2



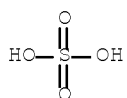
CM 3

CRN 80-07-9

CMF C12 H8 Cl2 O2 S



IT 7664-93-9, Sulfuric acid, reactions
 (synthesis and characterization of hydroquinone based
 disulfonated poly (arylene ether sulfone)s via direct copolymn.)
 RN 7664-93-9 HCA
 CN Sulfuric acid (CA INDEX NAME)



CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 Section cross-reference(s): 35, 38, 76
 ST hydroquinone disulfonated poly arylene ether sulfone copolymn
 membrane; proton exchange membrane cond copolymer
 sulfonated polyarylene ether sulfone
 IT Fuel cells

(membranes for; synthesis and characterization of hydroquinone based disulfonated poly (arylene ether sulfone)s via direct copolymn.)

IT Ion exchange membranes

(synthesis and characterization of hydroquinone based disulfonated poly (arylene ether sulfone)s via direct copolymn.)

IT 515144-67-9DP, proton exchanged

(synthesis and characterization of hydroquinone based disulfonated poly (arylene ether sulfone)s via direct copolymn.)

IT 7664-93-9, Sulfuric acid, reactions

(synthesis and characterization of hydroquinone based disulfonated poly (arylene ether sulfone)s via direct copolymn.)

RETABLE

Referenced Author | Year | VOL | PG | Referenced Work |
Referenced

(RAU) | (RPY) | (RVL) | (RPG) | (RWK) | File

=====+=====+=====+=====+=====+=====+=====

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Harrison, W | 2003 | 41 | 2264 | Journal of Polymer S |

Kim, Y | 2003 | 41 | 2816 | Journal of Polymer S | HCA

Wang, F | 2002 | 197 | 231 | Journal of Membrane | HCA

OS.CITING REF COUNT: 4 THERE ARE 4 CAPLUS RECORDS THAT CITE THIS
RECORD (4 CITINGS)

L98 ANSWER 9 OF 21 HCA COPYRIGHT 2010 ACS on STN

ACCESSION NUMBER: 141:226017 HCA Full-text

TITLE: Production of sulfonated polyaryletherketones as
proton exchangers for fuel
cells

INVENTOR(S): Moehwald, Helmut; Fischer, Andreas; Frambach,
Klaus; Hennig, Ingolf; Thate, Sven

PATENT ASSIGNEE(S): BASF Ag, Germany

SOURCE: Ger. Offen., 16 pp.

CODEN: GWXXBX

DOCUMENT TYPE: Patent

LANGUAGE: German

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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DE 10309135	A1	20040909	DE 2003-10309135	200302 28
			<--	
CA 2514946	A1	20040910	CA 2004-2514946	200402 27
			<--	
WO 2004076530	A1	20040910	WO 2004-EP1975	200402 27
			<--	

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA,
CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP,
KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW,
MX, MZ, NA, NI

RW: BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AT,
 BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE,
 IT, LU, MC, NL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI,
 CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG

EP 1599530 A1 20051130 EP 2004-715287 200402
 27

<--

R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC,
 PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU,
 SK

CN 1753932 A 20060329 CN 2004-80005401 200402
 27

<--

CN 100357339 C 20071226
 JP 2006519268 T 20060824 JP 2006-500042 200402
 27

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JP 4383443 B2 20091216
 US 20070117958 A1 20070524 US 2005-545084 200508
 09

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PRIORITY APPLN. INFO.: DE 2003-10309135 A 200302
 28

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WO 2004-EP1975 W 200402
 27

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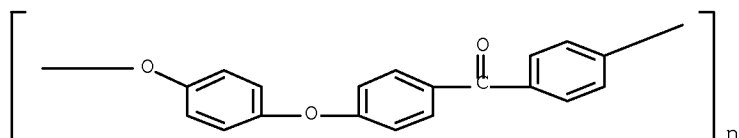
ASSIGNMENT HISTORY FOR US PATENT AVAILABLE IN LSUS DISPLAY FORMAT

AB A sulfonated polyaryletherketone is produced by reacting at least one polyaryletherketone with at least one alkanesulfonic acid to provide a sulfur-containing polyaryletherketone. The process optionally comprises a step of reacting the sulfur-containing polyaryletherketone with at least one sulfonating agent to provide a sulfonated polyaryletherketone. The sulfonated polyether-polyketones may be used as proton exchangers/~~membranes~~ in fuel cells. Thus, a polyaryletherketone (Victrex 450P) was treated with a solution of methanesulfonic acid at 45° overnight to obtain a polyaryletherketone containing 1.2% of sulfur, followed by reacting with oleum (25% of SO₃) at 45° for 4 h 15 min to obtain a sulfonated polyaryletherketone containing 5% of sulfur and having a sulfonation degree of 51.4%.

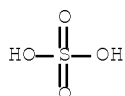
IT 31694-16-3DP, sulfonated
 (Victrex 150P and Victrex 450P; production of sulfonated polyaryletherketones as proton exchangers for fuel cells)

RN 31694-16-3 HCA

CN Poly(oxy-1,4-phenyleneoxy-1,4-phenylenecarbonyl-1,4-phenylene) (CA INDEX NAME)



IT 7664-93-9, Sulfuric acid, reactions
 (production of sulfonated polyaryletherketones as proton exchangers
 for fuel cells)
 RN 7664-93-9 HCA
 CN Sulfuric acid (CA INDEX NAME)



IPCI C08G0008-28 [ICM,7]; C08G0008-00 [ICM,7,C*]; B01D0071-72 [ICS,7];
 B01D0071-00 [ICS,7,C*]; H01M0008-02 [ICS,7]
 IPCR B01D0071-00 [I,C*]; B01D0071-52 [I,A]; B01D0071-82 [I,A];
 C08G0065-00 [I,C*]; C08G0065-48 [I,A]; H01M0008-10 [I,C*];
 H01M0008-10 [I,A]
 CC 35-8 (Chemistry of Synthetic High Polymers)
 Section cross-reference(s): 37, 52
 ST sulfonated polyaryletherketone proton exchanger fuel
 cell membrane
 IT Ion exchangers
 (acidic; production of sulfonated polyaryletherketones as proton
 exchangers for fuel cells)
 IT Sulfonic acids, reactions
 (alkanesulfonic; production of sulfonated polyaryletherketones as
 proton exchangers for fuel cells)
 IT Polyketones
 (polyether-, aromatic, sulfonated; production of sulfonated
 polyaryletherketones as proton exchangers for fuel
 cells)
 IT Polysulfones, uses
 (polyether-; production of sulfonated polyaryletherketones as proton
 exchangers for fuel cells)
 IT Polyethers, preparation
 (polyketone-, aromatic, sulfonated; production of sulfonated
 polyaryletherketones as proton exchangers for fuel
 cells)
 IT Polyethers, uses
 (polysulfone-; production of sulfonated polyaryletherketones as
 proton exchangers for fuel cells)
 IT Fuel cell separators
 Fuel cells
 (production of sulfonated polyaryletherketones as proton exchangers
 for)
 IT Polyelectrolytes
 (production of sulfonated polyaryletherketones as proton exchangers
 for fuel cells)
 IT Polysulfones, uses
 (production of sulfonated polyaryletherketones as proton exchangers
 for fuel cells)
 IT Polymer blends
 (production of sulfonated polyaryletherketones as proton exchangers
 for fuel cells)
 IT Plastics, uses
 (thermoplastics; production of sulfonated polyaryletherketones as

proton exchangers for fuel cells)

IT 31694-16-3DP, sulfonated
(Victrex 150P and Victrex 450P; production of sulfonated polyaryletherketones as proton exchangers for fuel cells)

IT 39317-73-2DP, Denacol EX 313, reaction products with sulfonated polyether-polyketones
(production of sulfonated polyaryletherketones as proton exchangers for fuel cells)

IT 25667-42-9, Ultrason E 6020P
(production of sulfonated polyaryletherketones as proton exchangers for fuel cells)

IT 75-75-2, Methanesulfonic acid 7664-93-9, Sulfuric acid, reactions 8014-95-7, Oleum
(production of sulfonated polyaryletherketones as proton exchangers for fuel cells)

OS.CITING REF COUNT: 3 THERE ARE 3 CAPLUS RECORDS THAT CITE THIS RECORD (3 CITINGS)

L98 ANSWER 10 OF 21 HCA COPYRIGHT 2010 ACS on STN

ACCESSION NUMBER: 141:210126 HCA Full-text

TITLE: Manufacturing process for membrane-electrode assemblies

INVENTOR(S): Masaka, Fusazumi; Kita, Kiyonori; Hama, Yuichiro; Iguchi, Masaru; Mitsuta, Naoki; Yano, Junichi

PATENT ASSIGNEE(S): JSR Corporation and Honda Motor Co., Ltd., Japan; Honda Motor Co., Ltd.

SOURCE: U.S. Pat. Appl. Publ., 13 pp.
CODEN: USXXCO

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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US 20040163760	A1	20040826	US 2004-773317	20040209
			<--	
US 7396607	B2	20080708		
JP 2004253267	A	20040909	JP 2003-42966	20030220
			<--	
JP 4068988	B2	20080326		
KR 2004075748	A	20040830	KR 2004-10949	20040219
			<--	
EP 1482589	A2	20041201	EP 2004-3826	20040219
			<--	
EP 1482589	A3	20051228		
EP 1482589	B1	20090218		
R:	AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU,			

SK

PRIORITY APPLN. INFO.:

JP 2003-42966

A

200302

20

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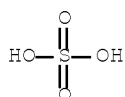
ASSIGNMENT HISTORY FOR US PATENT AVAILABLE IN LSUS DISPLAY FORMAT

AB The invention provides a manufacturing process for MEA that enables sufficient bond strength among an electrolyte ~~membrane~~ and ~~electrode~~ substrates even when the electrolyte ~~membrane~~ comprises a heat-resistant material such as an aromatic polymer. The process comprises pressure bonding an electrolyte ~~membrane~~ with catalyzed ~~electrode~~ substrates to form a ~~membrane-electrode~~ assembly, wherein a good solvent for the electrolyte ~~membrane~~ is applied to at least one of facing surfaces of the opposed ~~electrode~~ substrate and the electrolyte ~~membrane~~ prior to the pressure bonding. The electrolyte ~~membrane~~ may comprise a sulfonated aromatic polymer. The good solvent for the electrolyte ~~membrane~~ may be an aprotic dipolar solvent.

IT 7664-93-9, Sulfuric acid, processes
(manufacturing process for ~~membrane-electrode~~
assemblies)

RN 7664-93-9 HCA

CN Sulfuric acid (CA INDEX NAME)



IT 463963-71-5DP, 2,2-Bis(4-hydroxyphenyl)-1,1,1,3,3,3-hexafluoropropane-4,4'-dichloro
benzophenone-2,5-dichloro-4'-(4-phenoxy)phenoxybenzophenone
copolymer, **sulfonated**
(manufacturing process for ~~membrane-electrode~~
assemblies)

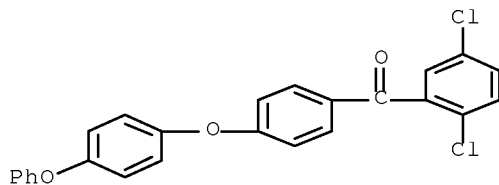
RN 463963-71-5 HCA

CN Methanone, bis(4-chlorophenyl)-, polymer with
(2,5-dichlorophenyl) [4-(4-phenoxyphenoxy)phenyl]methanone and
4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol]
(9CI) (CA INDEX NAME)

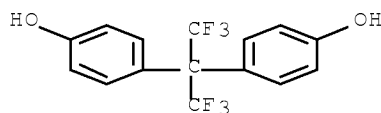
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CRN 463954-50-9

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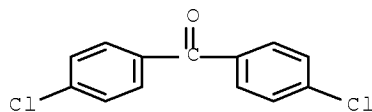


CRN 1478-61-1
CMF C15 H10 F6 O2



CM 3

CRN 90-98-2
CMF C13 H8 Cl2 O



INCL 156305000
IPCI H01M0004-00 [I,A]
IPCR H01M0008-02 [I,C*]; H01M0008-02 [I,A]; C08J0005-12 [I,C*];
C08J0005-12 [I,A]; H01M0008-10 [I,C*]; H01M0008-10 [I,A];
H01M0004-00 [I,C]; H01M0004-00 [I,A]; H01M0010-36 [I,C*];
H01M0010-40 [I,A]
NCL 156/305.000; 429/535.000; 429/483.000; 429/493.000
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 72
ST ~~membrane electrode~~ assembly manuf process;
~~fuel cell membrane electrode~~
assembly manuf process
IT Sulfonic acids
(arenesulfonic, polymers; manufacturing process for ~~membrane-~~
~~electrode~~ assemblies)
IT Polymers
(aromatic, sulfonated; manufacturing process for ~~membrane-~~
~~electrode~~ assemblies)
IT Electrochemical cells
Fuel cell electrodes
Fuel cell electrolytes
(manufacturing process for ~~membrane-electrode~~
assemblies)
IT 872-50-4, n-Methyl-2-pyrrolidone, uses
(manufacturing process for ~~membrane-electrode~~
assemblies)
IT 7664-93-9, Sulfuric acid, processes
(manufacturing process for ~~membrane-electrode~~
assemblies)
IT 122325-09-1P, Bisphenol AF-4,4'-dichlorobenzophenone copolymer
463963-71-5DP, 2,2-Bis(4-hydroxyphenyl)-1,1,1,3,3,3-
hexafluoropropane-4,4'-dichloro
benzophenone-2,5-dichloro-4'-(4-phenoxy)phenoxybenzophenone

copolymer, sulfonated

(manufacturing process for ~~membrane-electrode~~
assemblies)

IT 67-68-5, DmsO, uses 127-19-5, n,n-Dimethylacetamide
(manufacturing process for ~~membrane-electrode~~
assemblies)

RETABLE

Referenced Author	Year	VOL	PG	Referenced Work	
Referenced					
(RAU)	(RPY)	(RVL)	(RPG)	(RWK)	File
=====	+	=====	+	=====	+
==					
Anon	1996			EP 0718903 A1	HCA
Anon	2000			WO 0045448	HCA
Anon	2001			WO 0165623	HCA
Anon	2002			JP 2002075407	HCA
Anon	2002			JP 2002298869	HCA
Anon	2002			JP 2002298870	HCA
Bonsel	2001			US 6197147 B1	
Nanaumi	2002			US 20020155340 A1	HCA
Sansone	2001			US 6187231 B1	
Sompalli	2003			US 6524736 B1	HCA
Tabata	2002			US 20020071980 A1	HCA
Yamakawa	2003			US 20030173547 A1	HCA
OS.CITING REF COUNT:	1	THERE ARE 1 CAPLUS RECORDS THAT CITE THIS RECORD (3 CITINGS)			

L98 ANSWER 11 OF 21 HCA COPYRIGHT 2010 ACS on STN

ACCESSION NUMBER: 140:409513 HCA Full-text

TITLE: Synthesis and characterization of highly
sulfonated polyarylenethioethersulfones for
fuel cell applications

AUTHOR(S): Dang, Thuy D.; Bai, Zongwu; Dalton, Matthew J.;
Fossum, Eric

CORPORATE SOURCE: AFRL/MLBP, Materials and Manufacturing
Directorate, Wright-Patterson Air Force Base,
OH, 45433, USA

SOURCE: Polymer Preprints (American Chemical Society,
Division of Polymer Chemistry) (2004),
45(1), 22-23
CODEN: ACPPAY; ISSN: 0032-3934

PUBLISHER: American Chemical Society, Division of Polymer
Chemistry

DOCUMENT TYPE: Journal; (computer optical disk)

LANGUAGE: English

AB The development of new polymer electrolyte ~~membranes~~ has been necessitated by the fact that com. Nafion ~~membranes~~ do not meet the requirements for high temperature (>120 °C) ~~fuel cell~~ operation. In this paper, the synthesis and characterization of highly sulfonated polyarylenethioethersulfone are described. The polymer backbone is wholly aromatic, bulky aromatic end-caps, and there is high sulfuric acid content to enhance water retention and potential applicability for high temperature (>120 °C) ~~fuel cells~~ applications. Proton conductivities, solubilities in water and various solvents, mol. weight, intrinsic viscosity, and film properties were measured of polymers in the salt and also acid form, both uncapped and capped. The proton conductivity of polymers is at least three times higher than that of the state-of-the-art Nafion-H proton exchange ~~membrane~~ under nearly comparable conditions, indicating that these polymers are promising candidates for PEMs in ~~fuel cells~~.

IT 689262-96-2DP, endcapped with phenyl-based monohalides

689263-01-2DP, reaction products with phenyl-based monohalides

(acid form; synthesis and characterization of highly sulfonated polyarylenethioethersulfones for fuel cell applications)

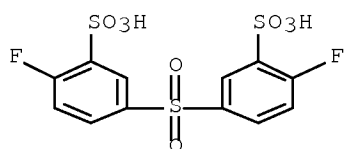
RN 689262-96-2 HCA

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-fluoro-, sodium salt (1:2), polymer with 4,4'-thiobis[benzenethiol] (CA INDEX NAME)

CM 1

CRN 301155-59-9

CMF C12 H8 F2 O8 S3 . 2 Na

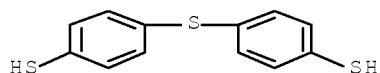


●2 Na

CM 2

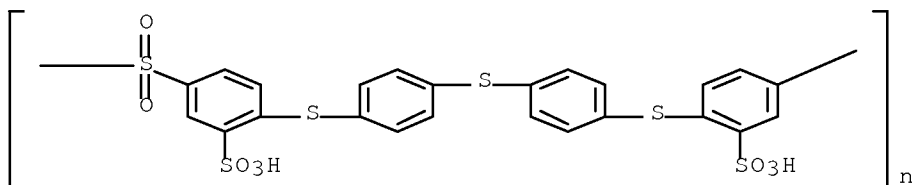
CRN 19362-77-7

CMF C12 H10 S3



RN 689263-01-2 HCA

CN Poly[sulfonyl(3-sulfo-1,4-phenylene)thio-1,4-phenylenethio-1,4-phenylenethio(2-sulfo-1,4-phenylene) sodium salt (1:2)] (CA INDEX NAME)



●2 Na

IT 689262-96-2P 689262-99-5DP, reaction products with phenyl-based monohalides 689263-01-2P

(synthesis and characterization of highly sulfonated
polyarylenethioethersulfones for fuel cell
applications)

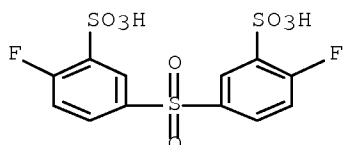
RN 689262-96-2 HCA

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-fluoro-, sodium salt (1:2),
polymer with 4,4'-thiobis[benzenethiol] (CA INDEX NAME)

CM 1

CRN 301155-59-9

CMF C12 H8 F2 O8 S3 . 2 Na

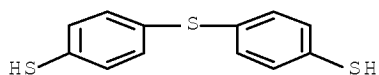


●2 Na

CM 2

CRN 19362-77-7

CMF C12 H10 S3



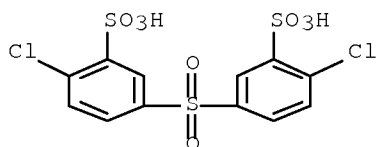
RN 689262-99-5 HCA

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, sodium salt (1:2),
polymer with 4,4'-thiobis[benzenethiol] (CA INDEX NAME)

CM 1

CRN 51698-33-0

CMF C12 H8 Cl2 O8 S3 . 2 Na

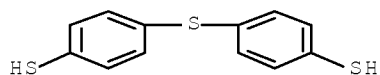


●2 Na

CM 2

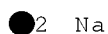
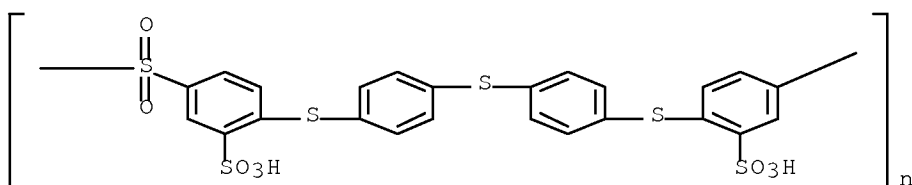
CRN 19362-77-7

CMF C12 H10 S3



RN 689263-01-2 HCA

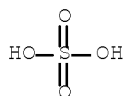
CN Poly[sulfonyl(3-sulfo-1,4-phenylene)thio-1,4-phenylenethio-1,4-phenylenethio(2-sulfo-1,4-phenylene) sodium salt (1:2)] (CA INDEX NAME)



IT 7664-93-9, Sulfuric acid, reactions
(synthesis and characterization of highly sulfonated
polyarylenethioethersulfones for fuel cell
applications)

RN 7664-93-9 HCA

CN Sulfuric acid (CA INDEX NAME)



CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 35, 38, 76

ST sulfonated poly aryleneethioether sulfone fuel cell
separator proton cond

IT Membranes, nonbiological
(elec. conductive; synthesis and characterization of highly
sulfonated polyarylenethioethersulfones for fuel
cell applications)

IT Fuel cell separators
(new materials for; synthesis and characterization of highly
sulfonated polyarylenethioethersulfones for fuel
cell applications)

IT Polysulfones, preparation
(polyarylene-polyether-; synthesis and characterization of highly

- sulfonated polyarylenethioethersulfones for fuel cell applications)
- IT Polyethers, preparation
(polyarylene-polysulfone-; synthesis and characterization of highly sulfonated polyarylenethioethersulfones for fuel cell applications)
- IT Polythioethers
(polysulfone-, aromatic; synthesis and characterization of highly sulfonated polyarylenethioethersulfones for fuel cell applications)
- IT Polysulfones, preparation
(polythioether-, aromatic; synthesis and characterization of highly sulfonated polyarylenethioethersulfones for fuel cell applications)
- IT 689262-96-2DP, endcapped with phenyl-based monohalides
689263-01-2DP, reaction products with phenyl-based monohalides
(acid form; synthesis and characterization of highly sulfonated polyarylenethioethersulfones for fuel cell applications)
- IT 584-08-7, Potassium carbonate
(synthesis and characterization of highly sulfonated polyarylenethioethersulfones for fuel cell applications)
- IT 126-33-0, Sulfolane
(synthesis and characterization of highly sulfonated polyarylenethioethersulfones for fuel cell applications)
- IT 689262-96-2P 689262-99-5DP, reaction products with phenyl-based monohalides 689263-01-2P
(synthesis and characterization of highly sulfonated polyarylenethioethersulfones for fuel cell applications)
- IT 64-19-7, Acetic acid, reactions 80-07-9, 4-Chlorophenyl sulfone
134-85-0, 4-Chlorobenzophenone 345-83-5, 4-Fluorobenzophenone
383-29-9, 4-Fluorophenyl sulfone 1310-73-2, Sodium hydroxide, reactions 7647-14-5, Sodium chloride, reactions 7664-93-9
, Sulfuric acid, reactions 19362-77-7, 4,4'-Thiobisbenzenethiol 51698-33-0
(synthesis and characterization of highly sulfonated polyarylenethioethersulfones for fuel cell applications)
- IT 301155-59-9P
(synthesis and characterization of highly sulfonated polyarylenethioethersulfones for fuel cell applications)

RETABLE

Referenced Author	Year	VOL	PG	Referenced Work	
(RAU)	(RPY)	(RVL)	(RPG)	(RWK)	File
=====+=====+=====+=====+=====+=====					
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Dang, T	2003	89	508	ACS National Meeting	HCA
Dimitrova, P	2002	150	115	Solid State Ionics	HCA
Matsumura, S	2001	34	2848	Macromolecules	HCA
Rikukawa, M	2000	25	1463	Prog Polym Sci	HCA
Schechter, A	2002	147	1815	Solid State Ionics	
Wainright, J	1995	142	L121	J Electrochem Soc	HCA
Wang, F	2002	197	231	Journal of Membrane	HCA
Wang, J	1996	41	193	Electrochimica Acta	HCA

Wiles, K |2002 |43 |1993 |ACS National Meeting|HCA
Zawodzinski, T |1991 |95 |16040 |Phys Chem |HCA
OS.CITING REF COUNT: 9 THERE ARE 9 CAPLUS RECORDS THAT CITE THIS
RECORD (9 CITINGS)

L98 ANSWER 12 OF 21 HCA COPYRIGHT 2010 ACS on STN
ACCESSION NUMBER: 140:393325 HCA Full-text
TITLE: Properties and proton conductivities of highly
sulfonated polyarylenethioethersulfones for
fuel cells
AUTHOR(S): Bai, Zongwu; Williams, Larry D.; Durstock,
Michael F.; Dang, Thuy D.
CORPORATE SOURCE: University of Dayton Research Institute, Dayton,
OH, 45469, USA
SOURCE: Polymer Preprints (American Chemical Society,
Division of Polymer Chemistry) (2004),
45(1), 60-61
CODEN: ACPPAY; ISSN: 0032-3934
PUBLISHER: American Chemical Society, Division of Polymer
Chemistry
DOCUMENT TYPE: Journal; (computer optical disk)
LANGUAGE: English

AB The Nafion-type membranes do not meet all of the requirements of proton
exchange membranes (PEMs) for fuel cell operations, and the unique hydration
capabilities, mech. integrity, and high thermal and oxidative stabilities, can
further be improved for high temperature PEMs. The authors developed a
material with an all aromatic polymer backbone with a high sulfonic acid
content. The end-capped sulfonated polyarylenethioether sulfone polymers
maintained high conductivity, and exhibited enhanced water resistance. This
paper describes processing and characterization of films. Proton conductivity
measurements were at 65X, 85% RH, and are about 4 times larger than Nafion 117
at the same conditions 0.08 S/cm. Higher mol. weight polymers proton
conductivity of 0.420 S/cm vs. 0.30 S/cm for the low MW polymers. Endcapping a
high MW sample with benzoxazole groups lowered the conductivity back to 0.30
S/cm, while end-capping with benzophenone raised the conductivity of a
relatively low MW sample to 0.36 S/cm. Lowered humidity lowered the
conductivity, with values comparable to Nafion 117 achieved at about 50%-60%
RH. Impedance plots show the uncapped polymers behave as simple resistors,
with phase angle about 0°. Endcapping also made the polymers insol. in water
and methanol, whereas the uncapped polymers were soluble in water and
methanol. All films were tough and transparent, with more flexibility in the
low MW sample, as would be expected.

IT 686768-99-0P, 3,3'-Disulfonated
-4,4'-difluorodiphenyl sulfone-4,4'-thiobisbenzenthioal alternating
copolymer 686769-00-6P 686769-01-7DP, end-capped
with benzophenone 686769-02-8P 686769-03-9P
686769-04-0P 686769-05-1P
(properties and proton conductivities of highly
sulfonated polyarylenethioethersulfones for fuel
cells)

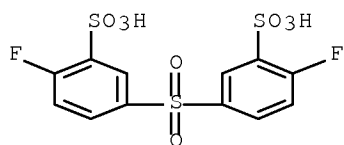
RN 686768-99-0 HCA

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-fluoro-, polymer with
4,4'-thiobis[benzenethiol] (9CI) (CA INDEX NAME)

CM 1

CRN 474242-18-7

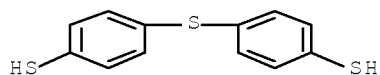
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CM 2

CRN 19362-77-7

CMF C12 H10 S3



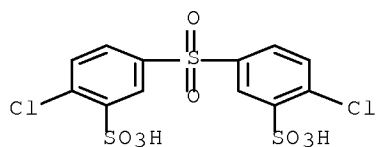
RN 686769-00-6 HCA

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, polymer with 4,4'-thiobis[benzenethiol] (CA INDEX NAME)

CM 1

CRN 57570-28-2

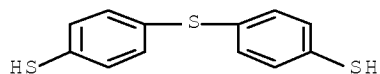
CMF C12 H8 Cl2 O8 S3



CM 2

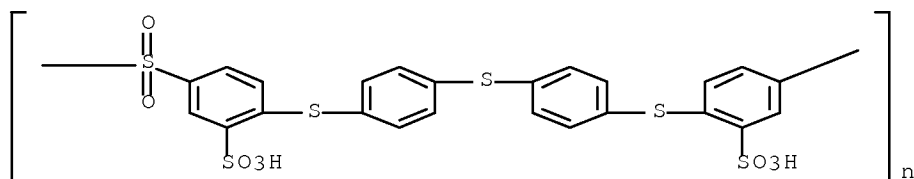
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RN 686769-01-7 HCA

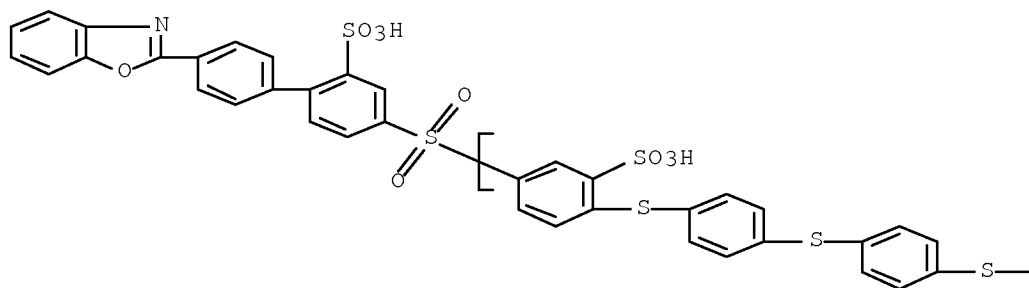
CN Poly[sulfonyl(3-sulfo-1,4-phenylene)thio-1,4-phenylenethio-1,4-phenylenethio(2-sulfo-1,4-phenylene)] (CA INDEX NAME)



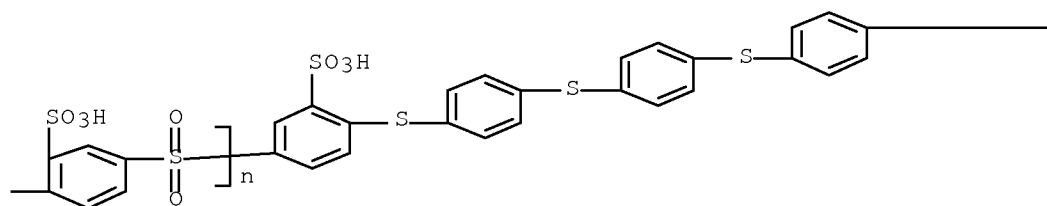
RN 686769-02-8 HCA

CN Poly[sulfonyl(3-sulfo-1,4-phenylene)thio-1,4-phenylenethio-1,4-phenylenethio(2-sulfo-1,4-phenylene)],
 α -[4-[[4-[[4-[[4-(2-benzoxazolyl)phenyl]thio]phenyl]thio]phenyl]thio]-3-sulfo-phenyl]-
 ω -[[4'-(2-benzoxazolyl)-2-sulfo[1,1'-biphenyl]-4-yl]sulfonyl]-
 (9CI) (CA INDEX NAME)

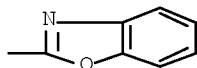
PAGE 1-A



PAGE 1-B

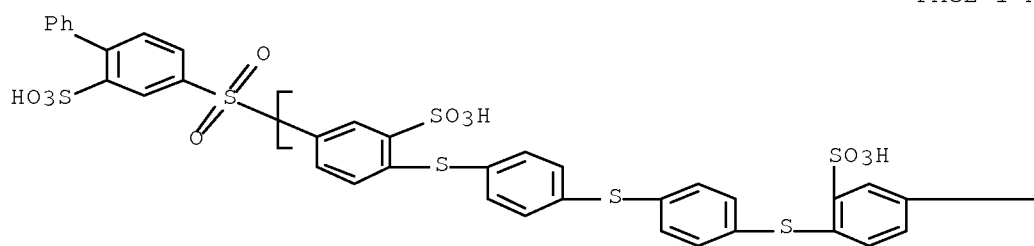


PAGE 1-C

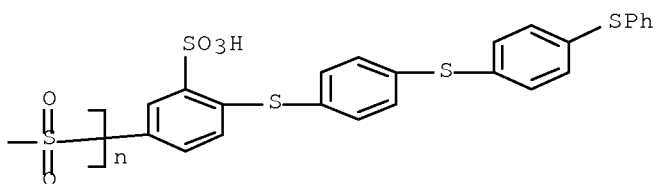


RN 686769-03-9 HCA
 CN Poly[sulfonyl(3-sulfo-1,4-phenylene)thio-1,4-phenylenethio-1,4-phenylenethio(2-sulfo-1,4-phenylene)],
 α -[4-[[4-[[4-(phenylthio)phenyl]thio]phenyl]thio]-3-sulfophenyl]- ω -[(3-sulfo[1,1'-biphenyl]-4-yl)sulfonyl]- (9CI)
 (CA INDEX NAME)

PAGE 1-A



PAGE 1-B

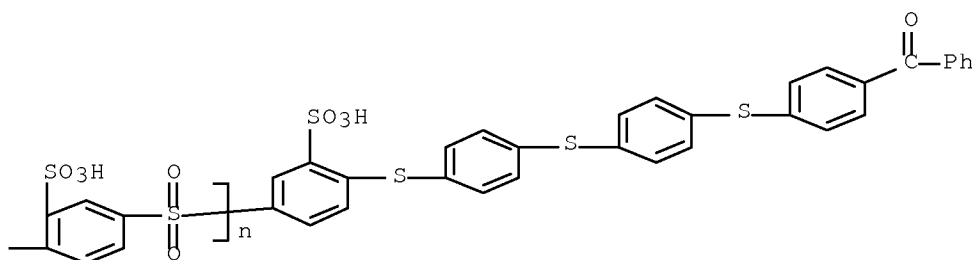


RN 686769-04-0 HCA
 CN Poly[sulfonyl(3-sulfo-1,4-phenylene)thio-1,4-phenylenethio-1,4-phenylenethio(2-sulfo-1,4-phenylene)],
 α -[4-[[4-[[4-([1,1'-biphenyl]-4-ylthio)phenyl]thio]phenyl]thio]-3-sulfophenyl]- ω -[(2-sulfo[1,1':4',1''-terphenyl]-4-yl)sulfonyl]- (9CI) (CA INDEX NAME)

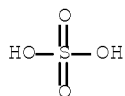
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CN Poly[sulfonyl(3-sulfo-1,4-phenylene)thio-1,4-phenylenethio-1,4-phenylenethio(2-sulfo-1,4-phenylene)],
 α -[4-[[4-[[4-[(benzoylphenyl)thio]phenyl]thio]phenyl]thio]-3-sulfo-phenyl]- ω -[(4'-benzoyl-2-sulfo[1,1'-biphenyl]-4-yl)sulfonyl]- (9CI) (CA INDEX NAME)

O=S(=O)(c1ccc(S)cc1)c2cc(cc(c2S)c3ccc(S)cc3)c4ccccc4C(=O)c5ccccc5



IT 7664-93-9, Sulfuric acid, reactions
 (properties and proton conductivities of highly sulfonated
 polyarylenethioethersulfones for fuel cells)
 RN 7664-93-9 HCA
 CN Sulfuric acid (CA INDEX NAME)



CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 Section cross-reference(s): 35, 36, 76
 ST proton cond sulfonated polyarylenethioethersulfone fuel
 cell membrane separator endcapped
 IT Polythioethers
 (polysulfone-, aromatic, sulfonated; properties and proton
 conductivities of highly sulfonated polyarylenethioethersulfones
 for fuel cells)
 IT Polysulfones, preparation
 (polythioether-, aromatic, sulfonated; properties and proton
 conductivities of highly sulfonated polyarylenethioethersulfones
 for fuel cells)
 IT 686768-99-0P, 3,3'-Disulfonated
 -4,4'-difluorodiphenyl sulfone-4,4'-thiobisbenzenthioal alternating
 copolymer 686769-00-6P 686769-01-7DP, end-capped
 with benzophenone 686769-02-8P 686769-03-9P
 686769-04-0P 686769-05-1P
 (properties and proton conductivities of highly
 sulfonated polyarylenethioethersulfones for fuel
 cells)
 IT 7664-93-9, Sulfuric acid, reactions 19362-77-7
 57570-28-2 474242-18-7
 (properties and proton conductivities of highly sulfonated
 polyarylenethioethersulfones for fuel cells)

RETABLE

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OS.CITING REF COUNT: 13 THERE ARE 13 CAPLUS RECORDS THAT CITE THIS RECORD (13 CITINGS)

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ACCESSION NUMBER: 140:256172 HCA Full-text

TITLE: Synthesis and characterization of sulfonated poly(ether ether ketone) for proton exchange membranes

AUTHOR(S): Xing, Peixiang; Robertson, Gilles P.; Guiver, Michael D.; Mikhailenko, Serguei D.; Wang, Keping; Kaliaguine, Serge

CORPORATE SOURCE: Institute for Chemical Process and Environmental Technology, National Research Council, Ottawa, ON, K1A 0R6, Can.

SOURCE: Journal of Membrane Science (2004), 229(1-2), 95-106
CODEN: JMESDO; ISSN: 0376-7388

PUBLISHER: Elsevier Science B.V.

DOCUMENT TYPE: Journal

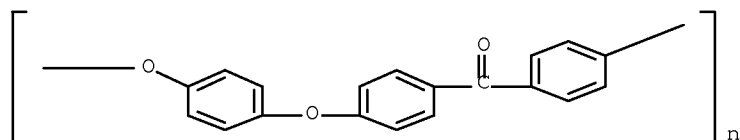
LANGUAGE: English

AB Series of sulfonated poly(ether ether ketone)s (SPEEKs) were prepared by sulfonation of com. Victrex and Gatone PEEK for a comparative study of proton exchange membranes (PEM) intended for fuel cell applications. The degree of sulfonation (DS) of the sulfonated PEEK was determined from deuterated DMSO (DMSO-d6) solution of the purified polymers using 1H NMR methods. The 2nd method using a solvent suppression technique, in which DS results were obtained directly from 1H NMR spectra of SPEEK dissolved in sulfuric acid (nondeuterated) reaction medium was evaluated. The variation between the two methods was determined. The room temperature sulfonation of PEEK, monitored directly by 2nd 1H NMR method, proceeded rapidly initially, reaching DS .apprx. 0.8 within 1 wk., but progressed slowly thereafter. A maximum DS of 1.0 was determined after 1 mo. at ambient temperature (.apprx. 22°). The thermal properties of SPEEK were characterized by DSC and TGA. The mass averaged mol. wts. Mw of both Victrex and Gatone PEEK were estimated from intrinsic viscosities measured in sulfuric acid solns. It was verified that higher temperature (55°) did not induce any apparent chain degradation of Victrex (or Gatone) PEEK by Mw tests. The water uptake and swelling properties of prepared films were studied and the proton conductivities at different temps. were measured. The conductivities of the SPEEKs increase with increasing DS and temps. The effect of film casting solvents on the conductivities is also discussed.

IT 31694-16-3DP, Victrex PEEK 450G, sulfonated
(Gatone PEEK 5300P; synthesis and characterization of sulfonated poly(ether ether ketone) for proton exchange membranes)

RN 31694-16-3 HCA

CN Poly(oxy-1,4-phenyleneoxy-1,4-phenylenecarbonyl-1,4-phenylene) (CA INDEX NAME)

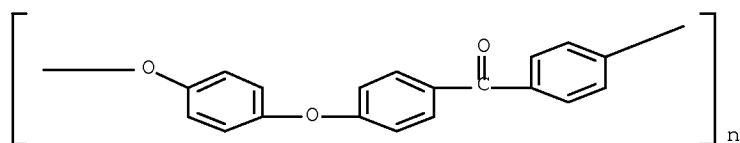


IT 31694-16-3, Gatone 5300P

(Victrex PEEK 450G; synthesis and characterization of sulfonated poly(ether ether ketone) for proton exchange membranes)

RN 31694-16-3 HCA

CN Poly(oxy-1,4-phenyleneoxy-1,4-phenylenecarbonyl-1,4-phenylene) (CA INDEX NAME)

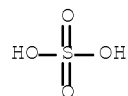


IT 7664-93-9, Sulfuric acid, analysis

(synthesis and characterization of sulfonated poly(ether ether ketone) for proton exchange membranes)

RN 7664-93-9 HCA

CN Sulfuric acid (CA INDEX NAME)



CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST sulfonated poly ether ketone proton exchange membrane cond SPEEK

IT Polyketones

(polyether-, sulfonated; synthesis and characterization of sulfonated poly(ether ether ketone) for proton exchange membranes)

IT Polyketones

(polyether-; synthesis and characterization of sulfonated poly(ether ether ketone) for proton exchange membranes)

IT Polyethers, preparation

(polyketone-, sulfonated; synthesis and characterization of sulfonated poly(ether ether ketone) for proton exchange membranes)

IT Polyethers, reactions

(polyketone-; synthesis and characterization of sulfonated poly(ether ether ketone) for proton exchange membranes)

IT Ionic conductivity

(proton; synthesis and characterization of sulfonated poly(ether

- ether ketone) for proton exchange membranes)
- IT Fuel cell separators
Ion exchange membranes
Polyelectrolytes
Sulfonation
(synthesis and characterization of sulfonated poly(ether ether ketone) for proton exchange membranes)
- IT Decomposition
(temperature of; synthesis and characterization of sulfonated poly(ether ether ketone) for proton exchange membranes)
- IT Swelling, physical
(with water; synthesis and characterization of sulfonated poly(ether ether ketone) for proton exchange membranes)
- IT 31694-16-3DP, Victrex PEEK 450G, sulfonated
(Gatone PEEK 5300P; synthesis and characterization of sulfonated poly(ether ether ketone) for proton exchange membranes)
- IT 31694-16-3, Gatone 5300P
(Victrex PEEK 450G; synthesis and characterization of sulfonated poly(ether ether ketone) for proton exchange membranes)
- IT 7732-18-5, Water, processes
(absorption; synthesis and characterization of sulfonated poly(ether ether ketone) for proton exchange membranes)
- IT 7664-93-9, Sulfuric acid, analysis
(synthesis and characterization of sulfonated poly(ether ether ketone) for proton exchange membranes)

RETABLE

Referenced Author	Year	VOL	PG	Referenced Work	
(RAU)	(RPY)	(RVL)	(RPG)	(RWK)	File

=====+=====+=====+=====+=====+=====

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Alberti, G	2001	185	73	J Membr Sci	HCA
Asensio, J	2002	40	3703	J Polym Sci A	HCA
Bailly, C	1987	28	1009	Polymer	HCA
Bauer, B	2000	3	93	J New Mater Electr S	HCA
Bishop, M	1985	18	86	Macromolecules	HCA
Daoust, D	1992			Advanced Thermoplast	
Daoust, D	2001	50	917	Polym Int	HCA
Daoust, D	2001	50	925	Polym Int	HCA
Devaux, J	1985	26		Polymer	HCA
Genies, C	2001	42	359	Polymer	HCA
Guo, X	2002	35	6707	Macromolecules	HCA
Helmer-Metamann, F	1995			US 5438082	HCA
Huang, R	2001	82	2651	J Appl Polym Sci	HCA
Inzelt, G	2000	45	2403	Electrochim Acta	HCA
Jin, X	1985	17	4	Br Polym J	HCA
Jones, D	2001	185	41	J Membr Sci	HCA
Kaliaguine, S	2003	82	213	Catal Today	HCA
Kerres, J	2001	185	3	J Membr Sci	HCA
Kerres, J	1999	125	243	Solid State Ionics	HCA
Kobayashi, T	1998	106	219	Solid State Ionics	HCA
Kreuer, K	2001	185	29	J Membr Sci	HCA
Kreuer, K	1995	95	241	Proc Electrochem Soc	
Luo, Y	1995	34	229	J Anal Appl Pyrol	HCA
Manea, C	2002	206	443	J Membr Sci	HCA
Mikhailenko, S	2000	38	1386	J Polym Sci B	HCA
Ogawa, T	1985	23	1231	J Polym Sci A	HCA
Rikukawa, M	2000	25	1463	Prog Polym Sci	HCA

Robertson, G	2003	219	113	J Membr Sci	HCA
Savadogo, O	1998	1	47	J New Mater Electr S	HCA
Shibuya, N	1994	35	3237	Polymer	HCA
Soczka-Guth, T	1999			WO 9929763	HCA
Ulrich, H	1998	263	71	Die Angew Makromol C	HCA
Wang, F	2002	197	231	J Membr Sci	HCA
Wang, F	1999	40	795	Polymer	HCA
Wijers, M	1998	147	117	J Membr Sci	HCA
Wilhelm, F	2002	199	167	J Membr Sci	HCA
Yen, S	1998			US 5795496	HCA
Zaidi, S	2000	173	17	J Membr Sci	HCA

OS.CITING REF COUNT: 257 THERE ARE 257 CAPLUS RECORDS THAT CITE THIS RECORD (258 CITINGS)

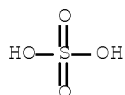
L98 ANSWER 14 OF 21 HCA COPYRIGHT 2010 ACS on STN
 ACCESSION NUMBER: 140:114078 HCA Full-text
 TITLE: Proton-conducting composite membranes derived from sulfonated hydrocarbon and inorganic materials
 AUTHOR(S): Chang, Jae-Hyuk; Park, Jong Hyeok; Park, Gu-Gon; Kim, Chang-Soo; Park, O. Ok
 CORPORATE SOURCE: Department of Chemical & Biomolecular Engineering, Korea Advanced Institute of Science and Technology, Daejeon, 305-701, S. Korea
 SOURCE: Journal of Power Sources (2003), 124(1), 18-25
 CODEN: JPSODZ; ISSN: 0378-7753
 PUBLISHER: Elsevier Science B.V.
 DOCUMENT TYPE: Journal
 LANGUAGE: English

AB Composite polymer membranes are prepared by embedding layered silicates such as Laponite and Montmorillonite (MMT) into sulfonated poly(ether ether ketone) (sPEEK) membranes for fuel-cell applications. Sulfonation of the polymer increased membrane hydrophilicity to give good proton conductivity. Layered silicates incorporated into polymer membranes help to reduce swelling significantly in hot water; they also help to decrease methanol permeability. These polymer/clay composite membranes show thermal stability to 240° and (3-3.5)+10⁻³ S cm⁻¹ proton conductivity at room temperature. Methanol cross-over is reduced without a serious reduction in the proton conductivity. In a single-cell test using hydrogen and oxygen, the prepared membranes give current densities that are 70-80% of those with Nafion 115 membranes. As a result, for polymer electrolytes, sPEEK/clay composite membranes offer a low-cost alternative to perfluorinated membranes.

IT 7664-93-9, Sulfuric acid, reactions 31694-16-3
 (proton-conducting composite membranes derived from sulfonated hydrocarbon and layered silicates)

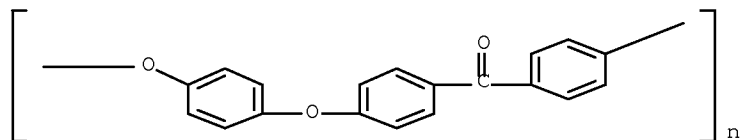
RN 7664-93-9 HCA

CN Sulfuric acid (CA INDEX NAME)



RN 31694-16-3 HCA

CN Poly(oxy-1,4-phenyleneoxy-1,4-phenylenecarbonyl-1,4-phenylene) (CA INDEX NAME)



- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 35, 38, 49, 76
- ST proton conducting composite clay membrane sulfonated
polymer fuel cell
- IT Membranes, nonbiological
(composite; proton-conducting composite membranes
derived from sulfonated hydrocarbon and layered silicates)
- IT Humidity
(effect on electrochem. performance of fuel
cell; proton-conducting composite membranes
derived from sulfonated hydrocarbon and layered silicates)
- IT Membranes, nonbiological
(elec. conductive; proton-conducting composite membranes
derived from sulfonated hydrocarbon and layered silicates)
- IT Ion exchange
(hydrogen for sodium in silicate structure; proton-conducting
composite membranes derived from sulfonated hydrocarbon
and layered silicates)
- IT Silicates, uses
(layered, embedded into SPEEK; proton-conducting composite
membranes derived from sulfonated hydrocarbon and layered
silicates)
- IT Carbon fibers, uses
(membrane electrode support;
proton-conducting composite membranes derived from
sulfonated hydrocarbon and layered silicates)
- IT Electric current-potential relationship
(of fuel cells with the membranes;
proton-conducting composite membranes derived from
sulfonated hydrocarbon and layered silicates)
- IT Electric resistance
(of membranes; proton-conducting composite
membranes derived from sulfonated hydrocarbon and layered
silicates)
- IT Polyketones
(polyether-, sulfonated, composite membranes with
clays; proton-conducting composite membranes derived
from sulfonated hydrocarbon and layered silicates)
- IT Polyethers, uses
(polyketone-, sulfonated, composite membranes with
clays; proton-conducting composite membranes derived
from sulfonated hydrocarbon and layered silicates)
- IT Current density
Fuel cell separators
Fuel cells
Permeability
Polymer electrolytes
Sulfonation
Thermal stability
(proton-conducting composite membranes derived from

sulfonated hydrocarbon and layered silicates)

IT Ionic conductivity
(proton; proton-conducting composite membranes derived
from sulfonated hydrocarbon and layered silicates)

IT 7732-18-5, Water, processes
(absorption of; proton-conducting composite membranes
derived from sulfonated hydrocarbon and layered silicates)

IT 647827-07-4
(embedded into SPEEK; proton-conducting composite
membranes derived from sulfonated hydrocarbon and layered
silicates)

IT 1333-74-0, Hydrogen, uses 7782-44-7, Oxygen, uses
(fuel cell fuel; proton-conducting
composite membranes derived from sulfonated hydrocarbon
and layered silicates)

IT 7440-06-4, Platinum, uses
(membrane electrode with Nafion/carbon;
proton-conducting composite membranes derived from
sulfonated hydrocarbon and layered silicates)

IT 7440-44-0, Carbon, uses
(membrane electrode with Nafion/platinum;
proton-conducting composite membranes derived from
sulfonated hydrocarbon and layered silicates)

IT 77950-55-1, Nafion 115
(membranes and membrane electrode
with Pt/carbon; proton-conducting composite membranes
derived from sulfonated hydrocarbon and layered silicates)

IT 67-56-1, Methanol, processes
(proton-conducting composite membranes derived from
sulfonated hydrocarbon and layered silicates)

IT 7664-93-9, Sulfuric acid, reactions 31694-16-3
(proton-conducting composite membranes derived from
sulfonated hydrocarbon and layered silicates)

IT 1318-93-0, Montmorillonite ((Al_{1.33}-1.67Mg_{0.33}-0.67)(Ca₀-1Na₀-
1)0.33Si₄(OH)₂10.xH₂O), uses
(sodium-rich, embedded into SPEEK; proton-conducting composite
membranes derived from sulfonated hydrocarbon and layered
silicates)

RETABLE

Referenced	Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	File
Bailly, C	1987	28	1009	Polymer	HCA	
Bishop, M	1985	18	86	Macromolecules	HCA	
Colquhoun, H	1997	38	4539	Polymer	HCA	
Jin, X	1985	17	4	Br Polym J	HCA	
Jochen, A	2001	185	3	J Membr Sci		
Kawahara, M	2000	136	1193	Solid State Ionics		
Kopitzke, R	2000	147	1677	J Electrochem Soc	HCA	
Kreuer, K	2001	185	29	J Membr Sci	HCA	
Pu, C	1995	142	119	J Electrochem Soc		
Rikukawa, M	2000	25	1463	Prog Polym Sci	HCA	
Wainright, J	1995	142	L121	J Electrochem Soc	HCA	
Walker, M	1999	116	996	Surf Coat Technol		
Wilhelm, F	2002	199	167	J Membr Sci	HCA	
Zanetti, M	2000	279	1	Macromol Mater Eng	HCA	
OS.CITING REF COUNT:	53	THERE ARE 53 CAPLUS RECORDS THAT CITE THIS RECORD (55 CITINGS)				

L98 ANSWER 15 OF 21 HCA COPYRIGHT 2010 ACS on STN

ACCESSION NUMBER: 140:96801 HCA Full-text

TITLE: Sulfonated poly(ether ether ketone)
membranes for direct methanol
fuel cell

AUTHOR(S): Li, Lei; Zhang, Jun; Wang, Yuxin

CORPORATE SOURCE: Membrane Technology Center, Chinese Academy of
Sciences, Shanghai Institute of Nuclear
Research, Shanghai, 201800, Peop. Rep. China

SOURCE: Journal of Membrane Science (2003),
226(1-2), 159-167

CODEN: JMESDO; ISSN: 0376-7388

PUBLISHER: Elsevier Science B.V.

DOCUMENT TYPE: Journal

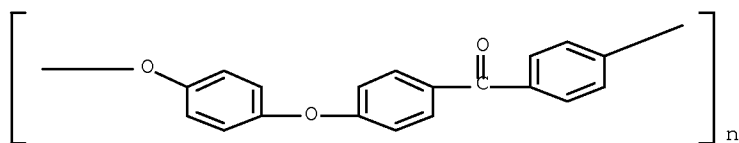
LANGUAGE: English

AB Sulfonated poly(ether ether ketone) (SPEEK) membranes with various degrees of sulfonation (DS) were prepared. Their proton conductivity and methanol permeability as a function of temperature were studied. The proton conductivity of SPEEK membranes exceeded 10⁻² S/cm >80°, which is close to that of Nafion 115 membrane under the same condition. The methanol permeability of SPEEK membranes was about an order of magnitude lower than that of Nafion 115 membrane. The direct methanol fuel cell (DMFC) performance of the SPEEK membranes was better than that of Nafion 115 membrane at 80°.

IT 31694-16-3DP, PEEK, sulfonated
(sulfonated poly(ether ether ketone) membranes
for direct methanol fuel cell)

RN 31694-16-3 HCA

CN Poly(oxy-1,4-phenyleneoxy-1,4-phenylenecarbonyl-1,4-phenylene) (CA
INDEX NAME)

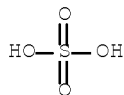


IT 7664-93-9, Sulfuric acid, reactions 31694-16-3,
PEEK

(sulfonated poly(ether ether ketone) membranes
for direct methanol fuel cell)

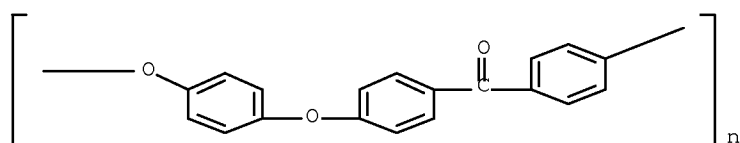
RN 7664-93-9 HCA

CN Sulfuric acid (CA INDEX NAME)



RN 31694-16-3 HCA

CN Poly(oxy-1,4-phenyleneoxy-1,4-phenylenecarbonyl-1,4-phenylene) (CA
INDEX NAME)



- ```

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 35, 36, 38, 76
ST sulfonated poly ether ketone membrane methanol
fuel cell permeability; PEEK sulfonated proton
cond membrane
IT Membrane electrodes
(containing carbon, Nafion, carbon cloth, and Pt or Pt/Ru; sulfonated
poly(ether ether ketone) membranes for direct methanol
fuel cell)
IT Membranes, nonbiological
(elec. conductive; sulfonated poly(ether ether ketone)
membranes for direct methanol fuel cell
)
IT Permeability
(of methanol through membranes; sulfonated poly(ether
ether ketone) membranes for direct methanol
fuel cell)
IT Polyketones
(polyether-, sulfonated; sulfonated poly(ether ether ketone)
membranes for direct methanol fuel cell
)
IT Polyethers, uses
(polyketone-, sulfonated; sulfonated poly(ether ether ketone)
membranes for direct methanol fuel cell
)
IT Ionic conductivity
(proton; sulfonated poly(ether ether ketone) membranes
for direct methanol fuel cell)
IT Fuel cell separators
Fuel cells
(sulfonated poly(ether ether ketone) membranes for
direct methanol fuel cell)
IT 7732-18-5, Water, processes
(absorption; sulfonated poly(ether ether ketone)
membranes for direct methanol fuel cell
)
IT 31694-16-3DP, PEEK, sulfonated
(sulfonated poly(ether ether ketone) membranes
for direct methanol fuel cell)
IT 77950-55-1, Nafion 115
(sulfonated poly(ether ether ketone) membranes for
direct methanol fuel cell)
IT 7782-42-5, Graphite, uses
(sulfonated poly(ether ether ketone) membranes for
direct methanol fuel cell)
IT 67-56-1, Methanol, uses
(sulfonated poly(ether ether ketone) membranes for
direct methanol fuel cell)
IT 7664-93-9, Sulfuric acid, reactions 31694-16-3,
PEEK
(sulfonated poly(ether ether ketone) membranes

```

for direct methanol fuel cell)

## RETABLE

| Referenced Author<br>Referenced<br>(RAU) | Year | VOL                                    | PG   | Referenced Work<br>(RWK) | File |
|------------------------------------------|------|----------------------------------------|------|--------------------------|------|
| =====                                    | +    | =====                                  | +    | =====                    | +    |
| ==                                       |      |                                        |      |                          |      |
| Bauer, B                                 | 2000 | 3                                      | 93   | J New Mater Electrochem  | HCA  |
| Bishop, M                                | 1985 | 18                                     | 86   | Macromolecules           | HCA  |
| Bouchet, R                               | 1997 | 144                                    | L95  | J Electrochem Soc        | HCA  |
| Choi, W                                  | 2001 | 96                                     | 411  | J Power Sources          | HCA  |
| Hogarth, M                               | 1996 | 40                                     | 150  | Platinum Met Rev         | HCA  |
| Huang, R                                 | 2001 | 82                                     | 2651 | J Appl Polym Sci         | HCA  |
| Jin, X                                   | 1985 | 17                                     | 4    | Br Polym J               | HCA  |
| Kerres, J                                | 2001 | 185                                    | 3    | J Membr Sci              | HCA  |
| Kopitzke, R                              | 2000 | 147                                    | 1677 | J Electrochem Soc        | HCA  |
| Kreuer, K                                | 2001 | 185                                    | 29   | J Membr Sci              | HCA  |
| Li, L                                    | 2003 | 3                                      | 452  | Acta Polym Sin           |      |
| Li, L                                    | 2002 | 10                                     | 614  | Chin J Chem Eng          | HCA  |
| Li, L                                    | 2003 | 57                                     | 1406 | Mater Lett               | HCA  |
| Pivovar, B                               | 1999 | 154                                    | 155  | J Membr Sci              | HCA  |
| Pu, C                                    | 1995 | 142                                    | L119 | J Electrochem Soc        | HCA  |
| Ren, X                                   | 1995 | 95                                     | 284  | Electrochem Soc Proc     |      |
| Rikukawa, M                              | 2000 | 25                                     | 1463 | Prog Polym Sci           | HCA  |
| Surampudi, S                             | 1994 | 47                                     | 377  | J Power Sources          | HCA  |
| Tricoli, V                               | 1998 | 145                                    | 3798 | J Electrochem Soc        | HCA  |
| Tricoli, V                               | 2000 | 147                                    | 1286 | J Electrochem Soc        | HCA  |
| Wang, J                                  | 1995 | 142                                    | 4218 | J Electrochem Soc        | HCA  |
| Yeo, R                                   | 1983 | 130                                    | 533  | J Electrochem Soc        | HCA  |
| Zaidi, S                                 | 2000 | 173                                    | 17   | J Membr Sci              | HCA  |
| Zhang, J                                 | 2002 | 8                                      | 315  | Electrochemistry         | HCA  |
| OS.CITING REF COUNT:                     | 134  | THERE ARE 134 CAPLUS RECORDS THAT CITE |      |                          |      |
|                                          |      | THIS RECORD (136 CITINGS)              |      |                          |      |

L98 ANSWER 16 OF 21 HCA COPYRIGHT 2010 ACS on STN

ACCESSION NUMBER: 140:96780 HCA Full-textTITLE: Organic/inorganic composite membranes  
for application in DMFCAUTHOR(S): Ruffmann, B.; Silva, H.; Schulte, B.; Nunes, S.  
P.CORPORATE SOURCE: Institute of Chemistry, GKSS Research Centre,  
Geesthacht, D-21502, GermanySOURCE: Solid State Ionics (2003), 162-163,  
269-275

CODEN: SSIOD3; ISSN: 0167-2738

PUBLISHER: Elsevier Science B.V.

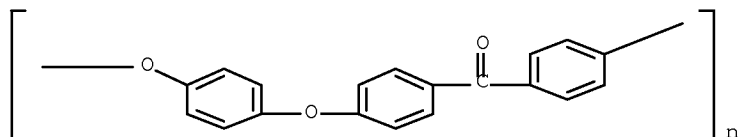
DOCUMENT TYPE: Journal

LANGUAGE: English

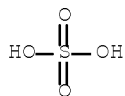
AB Zirconium phosphate as inorg. compound was chosen for studies concerning mainly the swelling behavior of composite membranes for the direct methanol fuel cell (DMFC). Swelling in liquid systems and in vapor systems at 100% relative humidity conditions was studied. The fluxes of water and methanol through the membranes were obtained from pervaporation expts. The conductivity of the developed membranes was determined by impedance spectroscopy. Two different cells for impedance measurements were used. In one cell, the membrane sample is in contact with an electrolyte solution during the measurement. In the 2nd cell, swelling of the membrane sample can be varied by controlling temperature and relative humidity (RH). The in situ generation of inorg. oxides like zirconia by hydrolysis of the alkoxides in the polymer solution decreases water and methanol flux through the membranes.

The addition of well-dispersed zirconium phosphate to the polymer solution increases the membranes' conductivity. Both effects can be explained by the swelling behavior of the composites. The performance of some membranes in a methanol fuel cell test system is discussed with regard to the swelling behavior and the methanol permeability.

IT 31694-16-3D, PEEK, sulfonated  
 (organic/inorg. composite membranes for application in DMFC)  
 RN 31694-16-3 HCA  
 CN Poly(oxy-1,4-phenyleneoxy-1,4-phenylenecarbonyl-1,4-phenylene) (CA INDEX NAME)



IT 7664-93-9, Sulfuric acid, reactions  
 (organic/inorg. composite membranes for application in DMFC)  
 RN 7664-93-9 HCA  
 CN Sulfuric acid (CA INDEX NAME)



CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 Section cross-reference(s): 36, 38, 76  
 ST sulfonated polyetherketone composite membrane DMFC cond permeability water sorption  
 IT Membrane electrodes  
 (carbon/PT or Pt-Ru/PTFE or Nafion; organic/inorg. composite membranes for application in DMFC)  
 IT Membranes, nonbiological  
 (composite; organic/inorg. composite membranes for application in DMFC)  
 IT Electric current-potential relationship  
 (of composite membranes assembled fuel cell; organic/inorg. composite membranes for application in DMFC)  
 IT Exfoliation  
 Fuel cell separators  
 Permeability  
 Pervaporation  
 Swelling, physical  
 (organic/inorg. composite membranes for application in DMFC)  
 IT Polybenzimidazoles  
 (organic/inorg. composite membranes for application in DMFC)

IT Polyketones  
(polyether-, sulfonated, composites membranes with zirconia and/or zirconium phosphate; organic/inorg. composite membranes for application in DMFC)

IT Polyethers, uses  
(polyketone-, sulfonated, composites membranes with zirconia and/or zirconium phosphate; organic/inorg. composite membranes for application in DMFC)

IT Composites  
(polymer/inorg.; organic/inorg. composite membranes for application in DMFC)

IT Ionic conductivity  
(proton; organic/inorg. composite membranes for application in DMFC)

IT Humidity  
(relative; organic/inorg. composite membranes for application in DMFC)

IT 13765-95-2P, Zirconium phosphate  
(composite membranes impregnated with; organic/inorg. composite membranes for application in DMFC)

IT 1314-23-4P, Zirconium dioxide, preparation  
(composite membranes impregnated with; organic/inorg. composite membranes for application in DMFC)

IT 124-38-9, Carbon dioxide, analysis  
(organic/inorg. composite membranes for application in DMFC)

IT ~~31694-16-3D~~, PEEK, sulfonated  
(organic/inorg. composite membranes for application in DMFC)

IT 67-56-1, Methanol, uses  
(organic/inorg. composite membranes for application in DMFC)

IT 163294-14-2, Nafion 112  
(organic/inorg. composite membranes for application in DMFC)

IT 107-10-8, n-Propylamine, reactions 7664-93-9, Sulfuric acid, reactions  
(organic/inorg. composite membranes for application in DMFC)

IT 7732-18-5, Water, processes  
(permeability of; organic/inorg. composite membranes for application in DMFC)

## RETABLE

| Referenced Author | Year  | VOL   | PG    | Referenced Work |      |
|-------------------|-------|-------|-------|-----------------|------|
| Referenced        |       |       |       |                 |      |
| (RAU)             | (RPY) | (RVL) | (RPG) | (RWK)           | File |

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|               |      |     |      |                      |     |
|---------------|------|-----|------|----------------------|-----|
| Alberti, G    | 2001 | 185 | 73   | J Membr Sci          | HCA |
| Alberti, G    | 1998 | 470 | 81   | J Mol Struct         | HCA |
| Alberti, G    | 2000 | 16  | 7663 | Langmuir             | HCA |
| Alberti, G    | 1996 | 84  | 97   | Solid State Ionics   | HCA |
| Belyakov, V   | 1999 |     |      | US 5932361           | HCA |
| Benavente, J  | 2000 | 175 | 43   | J Membr Sci          | HCA |
| Bonnet, B     | 2000 | 3   | 87   | J New Mater Electroc | HCA |
| Casciola, M   | 1989 | 35  | 67   | Solid State Ionics   |     |
| Choi, K       | 2000 | 86  | 197  | J Power Sources      | HCA |
| Choi, W       | 2001 | 96  | 411  | J Power Sources      | HCA |
| Costantino, U | 1997 | 97  | 261  | Solid State Ionics   | HCA |
| Dammak, L     | 2001 | 47  | 451  | Electrochim Acta     | HCA |

|              |      |     |      |                          |
|--------------|------|-----|------|--------------------------|
| Dreisbach, F | 2000 | 62  | 515  | J Therm Anal Calorim HCA |
| Freire, T    | 2001 | 503 | 57   | J Electroanal Chem  HCA  |
| Glipa, X     | 1997 | 97  | 227  | Solid State Ionics  HCA  |
| Gmehling, J  | 1977 |     |      | Vapour-Liquid Equili     |
| Gornet, N    | 1998 | 8   | Pr5  | J Phys, IV (France)      |
| Gulzow, E    | 2002 | 105 | 261  | J Power Sources  HCA     |
| Jones, D     | 2001 | 185 | 41   | J Membr Sci  HCA         |
| Jung, D      | 2001 | 26  | 1263 | Int J Hydrogen Energ HCA |
| Kim, J       | 2001 | 201 | 129  | J Membr Sci              |
| Kjaer, J     | 1991 | 46  | 169  | Solid State Ionics  HCA  |
| Kreuer, K    | 2001 | 185 | 29   | J Membr Sci  HCA         |
| Manea, C     | 2002 | 206 | 443  | J Membr Sci  HCA         |
| Nunes, S     | 2002 | 203 | 215  | J Membr Sci  HCA         |
| Park, Y      | 2000 | 19  | 1735 | J Mater Sci Lett  HCA    |

OS.CITING REF COUNT: 51 THERE ARE 51 CAPLUS RECORDS THAT CITE THIS RECORD (51 CITINGS)

L98 ANSWER 17 OF 21 HCA COPYRIGHT 2010 ACS on STN

ACCESSION NUMBER: 140:79707 HCA Full-text

TITLE: Polyetheretherketone ~~Membranes~~ for Elevated Temperature PEMFCs

AUTHOR(S): Lakshmanan, Balasubramanian; Huang, Wayne; Olmeijer, David; Weidner, John W.

CORPORATE SOURCE: Department of Chemical Engineering, Center for Electrochemical Engineering, University of South Carolina, Columbia, SC, 29208, USA

SOURCE: Electrochemical and Solid-State Letters ( 2003), 6(12), A282-A285  
CODEN: ESLEF6; ISSN: 1099-0062

PUBLISHER: Electrochemical Society

DOCUMENT TYPE: Journal

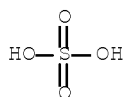
LANGUAGE: English

AB ~~Membrane electrode assemblies~~ (MEAs) made from polyetheretherketone (PEEK) showed excellent ~~fuel cell~~ performance and thermal stability in the presence of substantial CO at elevated temps. (i.e., 120°C) in proton exchange ~~membrane fuel cells~~ (PEMFCs). For example, the current from a MEA made from PEEK ~~membrane~~ at 0.6 V and 120°C was 0.50 A/cm<sup>2</sup> when run on pure hydrogen and 0.45 A/cm<sup>2</sup> when run on reformat (50% H<sub>2</sub>, 1300 ppm CO, and balance N<sub>2</sub>). The c.d. from a MEA made from Nafion at 0.6 V and 120°C was 0.61 A/cm<sup>2</sup> when run on pure hydrogen. The main difference between these two MEAs is that the ionic conductivity of the PEEK ~~membrane~~ at 120°C was 3.38+10<sup>-2</sup> S/cm, which is approx. three times lower than Nafion. Although it is not surprising that CO tolerance increases with increasing temperature, we are the first to show less than 10% drop in performance with 1300 ppm CO at 120°C. Even though Nafion ~~membranes~~ have higher conductivity, PEEK ~~membranes~~ lasted for 350 h thereby outlasting Nafion ~~membranes~~ by seven to eight times.

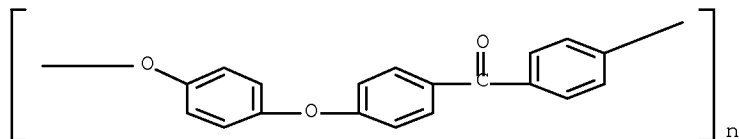
IT 7664-93-9, Sulfuric acid, processes  
(polyetheretherketone ~~membranes~~ for elevated temperature PEMFCs)

RN 7664-93-9 HCA

CN Sulfuric acid (CA INDEX NAME)



IT 31694-16-3D, PEEK, sulfonated  
 (polyetheretherketone membranes for elevated temperature PEMFCs)  
 RN 31694-16-3 HCA  
 CN Poly(oxy-1,4-phenyleneoxy-1,4-phenylenecarbonyl-1,4-phenylene) (CA INDEX NAME)



CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 Section cross-reference(s): 38, 72, 76  
 ST polyetheretherketone membrane elevated temp PEM fuel cell  
 IT Fuel cells  
 (PEM; polyetheretherketone membranes for elevated temperature PEMFCs)  
 IT Polyketones  
 (polyether-, sulfonated; polyetheretherketone membranes for elevated temperature PEMFCs)  
 IT Current density  
 Electric current-potential relationship  
 Fuel cell separators  
 Ionic conductivity  
 Sulfonation  
 Thermal stability  
 (polyetheretherketone membranes for elevated temperature PEMFCs)  
 IT Polybenzimidazoles  
 (polyetheretherketone membranes for elevated temperature PEMFCs)  
 IT Polyethers, uses  
 (polyketone-, sulfonated; polyetheretherketone membranes for elevated temperature PEMFCs)  
 IT Casting of polymeric materials  
 (solution; polyetheretherketone membranes for elevated temperature PEMFCs)  
 IT 7440-06-4, Platinum, uses 7440-18-8, Ruthenium, uses 7440-44-0, Carbon, uses  
 (polyetheretherketone membranes for elevated temperature PEMFCs)  
 IT 630-08-0, Carbon monoxide, processes 1333-74-0, Hydrogen, processes 7664-93-9, Sulfuric acid, processes 7727-37-9, Nitrogen, processes  
 (polyetheretherketone membranes for elevated temperature PEMFCs)  
 IT 25014-41-9, Polyacrylonitrile 31694-16-3D, PEEK, sulfonated  
 (polyetheretherketone membranes for elevated temperature PEMFCs)  
 IT 127-19-5, Dimethylacetamide  
 (polyetheretherketone membranes for elevated temperature PEMFCs)

RETABLE



| Referenced Author<br>(RAU) | Year<br>(RPY) | VOL<br>(RVL)                                                   | PG<br>(RPG) | Referenced Work<br>(RWK) | File |
|----------------------------|---------------|----------------------------------------------------------------|-------------|--------------------------|------|
| Adjemian, K                | 2002          | 149                                                            | A256        | J Electrochem Soc        | HCA  |
| Bonnet, B                  | 2000          | 3                                                              | 87          | J New Mater Electroc     | HCA  |
| Bristow, J                 | 1997          | 38                                                             | 287         | Polymer                  | HCA  |
| Dimitrova, P               | 2001          | 185                                                            | 59          | J Membr Sci              |      |
| Hirchenhofer, J            | 1998          |                                                                | 7           | Fuel Cells, A Handbo     |      |
| Kobayashi, T               | 1998          | 106                                                            | 219         | Solid State Ionics       | HCA  |
| Lee, S                     | 1999          | 44                                                             | 3283        | Electrochim Acta         | HCA  |
| Mikhailenko, S             | 2001          | 67                                                             | 225         | Catal Today              | HCA  |
| Miyake, N                  | 2001          | 148                                                            | A898        | J Electrochem Soc        | HCA  |
| Narang, S                  | 2002          |                                                                |             | US 127454                |      |
| Savinell, R                | 1998          | PV 98                                                          | 81          | The Electrochemical      |      |
| Staiti, P                  | 2001          | 145                                                            | 101         | Solid State Ionics       | HCA  |
| Tazi, B                    | 2000          | 45                                                             | 4329        | Electrochim Acta         | HCA  |
| Yang, C                    | 2001          | 103                                                            | 1           | J Power Sources          | HCA  |
| Yea, S                     | 1977          | 21                                                             | 875         | J Appl Polym Sci         |      |
| Zaidi, S                   | 2000          | 173                                                            | 17          | J Membr Sci              | HCA  |
| OS.CITING REF COUNT:       | 21            | THERE ARE 21 CAPLUS RECORDS THAT CITE THIS RECORD (21 CITINGS) |             |                          |      |

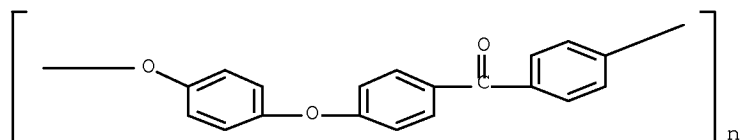
L98 ANSWER 18 OF 21 HCA COPYRIGHT 2010 ACS on STN  
 ACCESSION NUMBER: 140:44633 HCA Full-text  
 TITLE: Sulfonated Poly(ether ether ketone)  
 Membranes for Direct Methanol  
 Fuel Cells  
 AUTHOR(S): Yang, B.; Manthiram, A.  
 CORPORATE SOURCE: Materials Science and Engineering Program, The  
 University of Texas at Austin, Austin, TX,  
 78712, USA  
 SOURCE: Electrochemical and Solid-State Letters (  
 2003), 6(11), A229-A231  
 CODEN: ESLEF6; ISSN: 1099-0062  
 PUBLISHER: Electrochemical Society  
 DOCUMENT TYPE: Journal  
 LANGUAGE: English

AB Sulfonated poly(ether ether ketone) (SPEEK) with different degrees of  
 sulfonation was prepared and evaluated as proton exchange membrane  
 electrolytes in direct methanol fuel cells (DMFCs). The membranes were  
 characterized by ion-exchange capacity, proton conductivity, and liquid uptake  
 measurements. The proton conductivity of the SPEEK membranes increases with  
 increasing sulfonation level, and are lower than that of Nafion. The percent  
 liquid uptake increases with increasing temperature, methanol concentration,  
 and degree of sulfonation. Within a narrow range of sulfonation of  
 .apprx.50%, the SPEEK membranes exhibit electrochem. performances comparable  
 to or exceeding that of Nafion at 65°, making it an attractive low-cost  
 alternative to Nafion. The better performance of the SPEEK membranes is due  
 to the suppression of methanol permeability as indicated by a lower methanol  
 crossover c.d. at the cathode.

IT 31694-16-3DP, sulfonated  
 (sulfonated poly(ether ether ketone) membranes  
 for direct methanol fuel cell  
 electrodes)

RN 31694-16-3 HCA

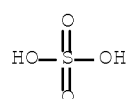
CN Poly(oxy-1,4-phenyleneoxy-1,4-phenylenecarbonyl-1,4-phenylene) (CA  
 INDEX NAME)



IT 7664-93-9, Sulfuric acid, reactions  
(sulfonated poly(ether ether ketone) membranes for  
direct methanol fuel cell electrodes  
)

RN 7664-93-9 HCA

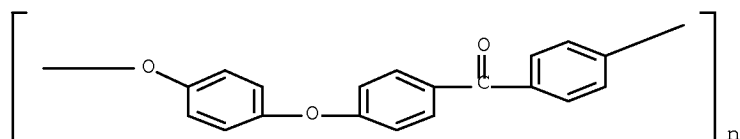
CN Sulfuric acid (CA INDEX NAME)



IT 31694-16-3  
(sulfonated poly(ether ether ketone) membranes  
for direct methanol fuel cell  
electrodes)

RN 31694-16-3 HCA

CN Poly(oxy-1,4-phenyleneoxy-1,4-phenylenecarbonyl-1,4-phenylene) (CA  
INDEX NAME)



CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 35, 38, 72, 76

ST sulfonated poly ether ketone membrane electrode  
methanol fuel cell

IT Polyelectrolytes  
(anionic; sulfonated poly(ether ether ketone) membranes  
for direct methanol fuel cell  
electrodes)

IT Carbon black, uses  
(composite electrodes with Nafion, and Pt and  
anodes also with Ru; sulfonated poly(ether ether ketone)  
membranes for direct methanol fuel cell  
electrodes)

IT Membranes, nonbiological  
(elec. conductive; sulfonated poly(ether ether ketone)  
membranes for direct methanol fuel cell  
electrodes)

IT Polyoxyalkylenes, uses

- (fluorine- and sulfo-containing, ionomers, composite electrodes with Vulcan XC-72R, and Pt and anodes also with Ru; sulfonated poly(ether ether ketone) membranes for direct methanol fuel cell electrodes)
- IT Current density
  - (loss due to methanol crossover; sulfonated poly(ether ether ketone) membranes for direct methanol fuel cell electrodes)
- IT Absorption
  - (of water and methanol by polyelectrolyte membranes SPEEK and Nafion 115; sulfonated poly(ether ether ketone) membranes for direct methanol fuel cell electrodes)
- IT Polyketones
  - (polyether-; sulfonated poly(ether ether ketone) membranes for direct methanol fuel cell electrodes)
- IT Polyethers, uses
  - (polyketone-; sulfonated poly(ether ether ketone) membranes for direct methanol fuel cell electrodes)
- IT Fluoropolymers, uses
  - (polyoxyalkylene-, sulfo-containing, ionomers, composite electrodes with Vulcan XC-72R, and Pt and anodes also with Ru; sulfonated poly(ether ether ketone) membranes for direct methanol fuel cell electrodes)
- IT Ionomers
  - (polyoxyalkylenes, fluorine- and sulfo-containing, composite electrodes with Vulcan XC-72R, and Pt and anodes also with Ru; sulfonated poly(ether ether ketone) membranes for direct methanol fuel cell electrodes)
- IT Ionic conductivity
  - (proton; sulfonated poly(ether ether ketone) membranes for direct methanol fuel cell electrodes)
- IT Electric current-potential relationship
  - Electric impedance
  - Fuel cells
  - Membrane electrodes
  - Sulfonation
    - (sulfonated poly(ether ether ketone) membranes for direct methanol fuel cell electrodes)
- IT Ion exchange
  - (to characterize degree of sulfonation; sulfonated poly(ether ether ketone) membranes for direct methanol fuel cell electrodes)
- IT 7732-18-5, Water, processes
  - (absorption of; sulfonated poly(ether ether ketone) membranes for direct methanol fuel cell electrodes)
- IT 7440-18-8, Ruthenium, uses
  - (composite electrodes with Vulcan XC-72R, Nafion, and Pt; sulfonated poly(ether ether ketone) membranes for direct methanol fuel cell electrodes)
- IT 7440-06-4, Platinum, uses

(composite electrodes with Vulcan XC-72R, Nafion, and anodes also with Ru; sulfonated poly(ether ether ketone) membranes for direct methanol fuel cell electrodes)

IT 77950-55-1, Nafion 115

(for comparison membrane electrode assembly; sulfonated poly(ether ether ketone) membranes for direct methanol fuel cell electrodes)

IT 31694-16-3DP, sulfonated

(sulfonated poly(ether ether ketone) membranes for direct methanol fuel cell electrodes)

IT 67-56-1, Methanol, uses

(sulfonated poly(ether ether ketone) membranes for direct methanol fuel cell electrodes)

IT 7664-93-9, Sulfuric acid, reactions

(sulfonated poly(ether ether ketone) membranes for direct methanol fuel cell electrodes)

IT 31694-16-3

(sulfonated poly(ether ether ketone) membranes for direct methanol fuel cell electrodes)

#### RETABLE

| Referenced Author<br>(RAU) | Year<br>(RPY) | VOL<br>(RVL) | PG<br>(RPG) | Referenced Work<br>(RWK) | File |
|----------------------------|---------------|--------------|-------------|--------------------------|------|
|----------------------------|---------------|--------------|-------------|--------------------------|------|

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|                |      |     |      |                             |     |
|----------------|------|-----|------|-----------------------------|-----|
| Bauer, B       | 2000 | 3   | 93   | J New Mater Electrochem Soc | HCA |
| Bishop, M      | 1985 | 18  | 86   | Macromolecules              | HCA |
| Bonnet, B      | 2000 | 3   | 87   | J New Mater Electrochem Soc | HCA |
| Eisenberg, A   | 1982 |     |      | Perfluorinated Ionomer      | HCA |
| Fang, J        | 2002 | 35  | 9022 | Macromolecules              | HCA |
| Genies, C      | 2001 | 42  | 359  | Polymer                     | HCA |
| Kerres, J      | 1999 | 125 | 243  | Solid State Ionics          | HCA |
| Kreuer, K      | 2001 | 185 | 29   | J Membr Sci, Sp Iss         | HCA |
| Kreuer, K      | 2000 | 10  | 279  | J Phys IV                   |     |
| Kreuer, K      | 1997 | 97  | 1    | Solid State Ionics          | HCA |
| Lufrano, F     | 2001 | 145 | 47   | Solid State Ionics          | HCA |
| Manea, C       | 2002 | 206 | 443  | J Membr Sci, Sp Iss         | HCA |
| Nunes, S       | 2002 | 203 | 215  | J Membr Sci                 | HCA |
| Ren, X         | 2000 | 147 | 466  | J Electrochem Soc           | HCA |
| Ren, X         | 2000 | 147 | 92   | J Electrochem Soc           | HCA |
| Rikukawa, M    | 2000 | 25  | 1463 | Prog Polym Sci              | HCA |
| Samms, S       | 1996 | 143 | 1498 | J Electrochem Soc           | HCA |
| Schechter, A   | 2002 | 147 | 181  | Solid State Ionics          | HCA |
| Sone, Y        | 1996 | 143 | 1254 | J Electrochem Soc           | HCA |
| Wang, J        | 1996 | 26  | 751  | J Appl Electrochem          | HCA |
| Xiong, L       | 2002 | 4   | 898  | Electrochem Commun          | HCA |
| Zaidi, S       | 2000 | 173 | 17   | J Membr Sci                 | HCA |
| Zawodzinski, T | 1993 | 140 | 1041 | J Electrochem Soc           | HCA |
| Zawodzinski, T | 1993 | 140 | 1981 | J Electrochem Soc           | HCA |

OS.CITING REF COUNT: 78 THERE ARE 78 CAPLUS RECORDS THAT CITE THIS RECORD (79 CITINGS)

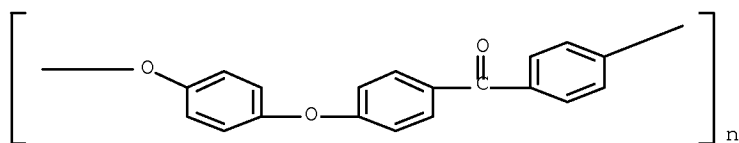
TITLE: Properties of SPEEK based PEMs for fuel cell application  
 AUTHOR(S): Kaliaguine, S.; Mikhailenko, S. D.; Wang, K. P.; Xing, P.; Robertson, G.; Guiver, M.  
 CORPORATE SOURCE: Chemical Engineering Department, Laval University, QC, Can.  
 SOURCE: Catalysis Today (2003), 82(1-4), 213-222  
 CODEN: CATTEA; ISSN: 0920-5861  
 PUBLISHER: Elsevier Science B.V.  
 DOCUMENT TYPE: Journal  
 LANGUAGE: English

AB Comparative studies of membranes prepared using different solvents, showed that the casting solvent plays a significant role, affecting their proton conductivity and mech. strength. Using DMF strongly decreases the membrane conductivity in comparison with other solvents studied. The <sup>1</sup>H NMR results yield an insight into the mechanism of this effect, evidencing the formation of the strong hydrogen bonding of sulfonic acid groups with DMF. This can explain the large discordances of more than an order of magnitude existing between the conductivity results for sulfonated polyetheretherketone (PEEK) in some previous studies and. Also residual sulfuric acid, which is very difficult to eliminate from highly sulfonated polyetheretherketone (SPEEK), also affects its conductivity and under high temperature treatment, enters into reaction with both DMF and N,N-dimethylacetamide (DMAc), causing their degradation. As discussed in the present contribution, the conductivity measurement technique may also be a reason for discrepancy in the reported conductivity characteristics of SPEEK.

IT 31694-16-3DP, sulfonated  
 (properties of SPEEK based PEMs for fuel cell application)

RN 31694-16-3 HCA

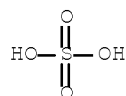
CN Poly(oxy-1,4-phenyleneoxy-1,4-phenylenecarbonyl-1,4-phenylene) (CA INDEX NAME)



IT 7664-93-9, Sulfuric acid, reactions  
 (properties of SPEEK based PEMs for fuel cell application)

RN 7664-93-9 HCA

CN Sulfuric acid (CA INDEX NAME)



CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 Section cross-reference(s): 36, 38, 76

- ST SPEEK fuel cell separator proton cond  
membrane sulfonated PEEK; polyetheretherketone sulfonated  
hydrogen bonding Tg water sorption solvent effect
- IT Solvents  
(effect on membrane properties; properties of SPEEK  
based PEMs for fuel cell application)
- IT Membranes, nonbiological  
(elec. conductive; properties of SPEEK based PEMs for  
fuel cell application)
- IT Glass transition temperature  
(of sulfonated PEEK polymers, influence of casting solvent on;  
properties of SPEEK based PEMs for fuel cell  
application)
- IT Polyketones  
(polyether-, Gatone PEEK and Victrex PEEK; properties of SPEEK  
based PEMs for fuel cell application)
- IT Polyketones  
(polyether-, sulfonated, Victrex PEEK and Gatone PEEK; properties  
of SPEEK based PEMs for fuel cell  
application)
- IT Polyethers, reactions  
(polyketone-, Gatone PEEK and Victrex PEEK; properties of SPEEK  
based PEMs for fuel cell application)
- IT Polyethers, uses  
(polyketone-, sulfonated, Victrex PEEK and Gatone PEEK;  
properties of SPEEK based PEMs for fuel cell  
application)
- IT Fuel cell electrolytes  
Fuel cell separators  
Hydrogen bond  
Thermal stability  
(properties of SPEEK based PEMs for fuel cell  
application)
- IT Ionic conductivity  
(proton; properties of SPEEK based PEMs for fuel  
cell application)
- IT 31694-16-3, PEEK  
(Victrex PEEK and Gatone PEEK; properties of SPEEK based PEMs for  
fuel cell application)
- IT 7732-18-5, Water, uses  
(blend with acetone, and absorption; properties of SPEEK based  
PEMs for fuel cell application)
- IT 67-64-1, Acetone, uses  
(blend with water; properties of SPEEK based PEMs for  
fuel cell application)
- IT 144-55-8, Sodium bicarbonate, uses  
(effect on hydrogen bonding in cast films; properties of SPEEK  
based PEMs for fuel cell application)
- IT 31694-16-3DF, sulfonated  
(properties of SPEEK based PEMs for fuel cell  
application)
- IT 68-12-2, DMF, uses 127-19-5, N,N-Dimethylacetamide  
(properties of SPEEK based PEMs for fuel cell  
application)
- IT 7664-93-9, Sulfuric acid, reactions  
(properties of SPEEK based PEMs for fuel cell  
application)

## RETABLE

| Referenced Author | Year | VOL | PG | Referenced Work |  |
|-------------------|------|-----|----|-----------------|--|
| Referenced        |      |     |    |                 |  |

| (RAU)                                                           | (RPY) | (RVL) | (RPG) | (RWK)                | File |
|-----------------------------------------------------------------|-------|-------|-------|----------------------|------|
| =====                                                           |       |       |       |                      |      |
| ==                                                              |       |       |       |                      |      |
| Bishop, M                                                       | 1985  | 18    | 86    | Macromolecules       | HCA  |
| Bonnet, B                                                       | 2000  | 3     | 87    | J New Mater Electroc | HCA  |
| Cui, W                                                          | 1998  | 14    | 145   | Separ Purif Technol  | HCA  |
| Genies, R                                                       | 2001  | 42    | 359   | Polymer              |      |
| Ise, M                                                          | 1999  | 125   | 213   | Solid State Ionics   | HCA  |
| Kim, Y                                                          | 2001  | 85    | 521   | Polym Mater Sci Eng  |      |
| Kobayashi, T                                                    | 1998  | 106   | 219   | Solid State Ionics   | HCA  |
| Kreuer, K                                                       | 2001  | 185   | 185   | J Membr Sci          |      |
| Lufrano, F                                                      | 2000  | 77    | 250   | J Appl Polym Sci     |      |
| Mikhailenko, S                                                  | 2001  | 67    | 225   | Catal Today          | HCA  |
| Mikhailenko, S                                                  | 2000  | 38    | 1386  | J Polym Sci B (Physi | HCA  |
| Park, M                                                         | 1996  | 64    | 743   | Denki Kagaku         | HCA  |
| Rikukawa, M                                                     | 2000  | 25    | 1463  | Prog Polym Sci       | HCA  |
| Samms, S                                                        | 1996  | 143   | 1225  | J Electrochem Soc    | HCA  |
| Savadogo, O                                                     | 1998  | 1     | 47    | J New Mater Electroc | HCA  |
| Wang, F                                                         | 2002  | 197   | 231   | J Membr Sci          | HCA  |
| Zaidi, J                                                        | 2000  | 3     | 27    | J New Mater Electroc |      |
| Zaidi, S                                                        | 2000  | 173   | 17    | J Membr Sci          | HCA  |
| Zawodzinski, T                                                  | 1991  | 95    | 6040  | J Phys Chem          |      |
| OS.CITING REF COUNT: 100 THERE ARE 100 CAPLUS RECORDS THAT CITE |       |       |       |                      |      |
| THIS RECORD (100 CITINGS)                                       |       |       |       |                      |      |

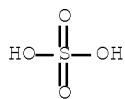
L98 ANSWER 20 OF 21 HCA COPYRIGHT 2010 ACS on STN  
 ACCESSION NUMBER: 139:77168 HCA Full-text  
 TITLE: Sulfonated polyarylene composition and  
 proton-conductive membrane  
 INVENTOR(S): Okaniwa, Motoki; Goto, Kohei  
 PATENT ASSIGNEE(S): JSR Ltd., Japan  
 SOURCE: Jpn. Kokai Tokkyo Koho, 13 pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

| PATENT NO.    | KIND | DATE     | APPLICATION NO. | DATE         |
|---------------|------|----------|-----------------|--------------|
| -----         | ---- | -----    | -----           |              |
| JP 2003183526 | A    | 20030703 | JP 2001-391748  | 200112<br>25 |

PRIORITY APPLN. INFO.: JP 2001-391748  
 200112  
 25

AB The composition contains a sulfonated polyarylene, a hindered phenol with mol.  
 weight  $\geq 500$ , and a hindered amine with mol. weight  $\geq 500$ . The proton-  
 conductive membrane, useful as a solid electrolyte in a fuel cell, etc., is  
 made of the composition showing resistance to oxidation and mech. strength.  
 IT 7664-93-9DP, Sulfuric acid, polyarylene sulfonate with  
 463963-71-5DP, Bisphenol  
 AF-4,4'-dichlorobenzophenone-2,5-dichloro-4'-(4-  
 phenoxy)phenoxybenzophenone copolymer, sulfonated  
 (sulfonated polyarylene composition containing hindered phenol  
 and hindered amine antioxidants for proton-conductive  
 membrane)

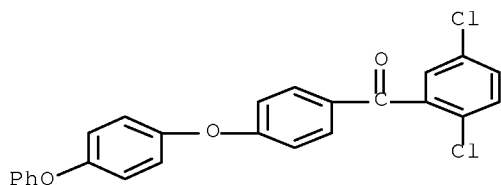
RN 7664-93-9 HCA  
CN Sulfuric acid (CA INDEX NAME)



RN 463963-71-5 HCA  
CN Methanone, bis(4-chlorophenyl)-, polymer with  
(2,5-dichlorophenyl)[4-(4-phenoxyphenoxy)phenyl]methanone and  
4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol]  
(9CI) (CA INDEX NAME)

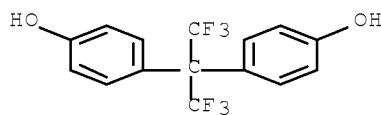
CM 1

CRN 463954-50-9  
CMF C25 H16 Cl2 O3



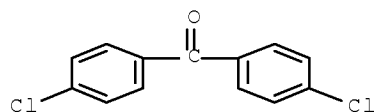
CM 2

CRN 1478-61-1  
CMF C15 H10 F6 O2



CM 3

CRN 90-98-2  
CMF C13 H8 Cl2 O





IPCI C08L0101-06 [ICM,7]; C08L0101-00 [ICM,7,C\*]; C08K0005-13 [ICS,7];  
 C08K0005-3435 [ICS,7]; C08K0005-00 [ICS,7,C\*]; H01B0001-06 [ICS,7];  
 H01M0008-02 [ICS,7]  
 IPCR C08L0101-00 [I,C\*]; C08L0101-06 [I,A]; C08K0005-00 [I,C\*];  
 C08K0005-13 [I,A]; C08K0005-3435 [I,A]; H01B0001-06 [I,C\*];  
 H01B0001-06 [I,A]; H01M0008-02 [I,C\*]; H01M0008-02 [I,A]  
 CC 76-2 (Electric Phenomena)  
 Section cross-reference(s): 38  
 ST sulfonated polyarylene compn proton conductive ~~membrane~~;  
 hindered phenol antioxidant sulfonated polyarylene; amine hindered  
 antioxidant sulfonated polyarylene  
 IT Amines, uses  
 Phenols, uses  
 (hindered; sulfonated polyarylene composition containing hindered phenol  
 and hindered amine antioxidants for proton-conductive  
~~membrane~~)  
 IT Polyoxyarylenes  
 (polyketone-; sulfonated polyarylene composition containing hindered  
 phenol and hindered amine antioxidants for proton-conductive  
~~membrane~~)  
 IT Ionic conductors  
 (polymeric, protonic; sulfonated polyarylene composition containing  
 hindered phenol and hindered amine antioxidants for  
 proton-conductive ~~membrane~~)  
 IT Polyketones  
 (polyoxyarylene-; sulfonated polyarylene composition containing hindered  
 phenol and hindered amine antioxidants for proton-conductive  
~~membrane~~)  
 IT Antioxidants  
 (sulfonated polyarylene composition containing hindered phenol and  
 hindered amine antioxidants for proton-conductive  
~~membrane~~)  
 IT 7664-93-9DP, Sulfuric acid, polyarylene sulfonate with  
 364062-39-5DP, 4,4'-Dichlorobenzophenone-2,5-dichloro-4'-  
 phenoxybenzophenone copolymer, sulfonated 463963-71-5DP,  
 Bisphenol AF-4,4'-dichlorobenzophenone-2,5-dichloro-4'-(4-  
 phenoxy)phenoxybenzophenone copolymer, sulfonated  
 (sulfonated polyarylene composition containing hindered phenol  
 and hindered amine antioxidants for proton-conductive  
~~membrane~~)  
 IT 1455-42-1D, 3,9-Bis(2-hydroxy-1,1-dimethylethyl)-2,4,8,10-  
 tetraoxaspiro[5.5]undecane, mixed ester 1703-58-8D,  
 1,2,3,4-Butanetetra-carboxylic acid, mixed ester 1709-70-2,  
 1,3,5-Trimethyl-2,4,6-tris[3,5-di(tert-butyl)-4-  
 hydroxybenzyl]benzene 2403-89-6D,  
 1,2,2,6,6-Pentamethyl-4-piperidinol, mixed ester 10563-26-5D,  
 N,N'-Bis(3-aminopropyl)ethylenediamine, reaction product with  
 triazine 27676-62-6, Tris[3,5-di(tert-butyl)-4-hydroxybenzyl]  
 isocyanurate 75720-76-2D, reaction product with  
 bisaminopropylethylenediamine  
 (sulfonated polyarylene composition containing hindered phenol and  
 hindered amine antioxidants for proton-conductive  
~~membrane~~)  
 OS.CITING REF COUNT: 3 THERE ARE 3 CAPLUS RECORDS THAT CITE THIS  
 RECORD (3 CITINGS)

L98 ANSWER 21 OF 21 HCA COPYRIGHT 2010 ACS on STN  
 ACCESSION NUMBER: 136:265790 HCA Full-text  
 TITLE: Inorganically modified sulfonated organic

polymer ~~membranes~~ for direct-methanol  
fuel cells

INVENTOR(S): Pereira Nunes, Suzana; Peinemann, Klaus-Viktor;  
Rikowski, Eckhard; Paul, Dieter; Fritsch, Detlev

PATENT ASSIGNEE(S): GKSS-Forschungszentrum Geesthacht GmbH, Germany

SOURCE: Eur. Pat. Appl., 7 pp.  
CODEN: EPXXDW

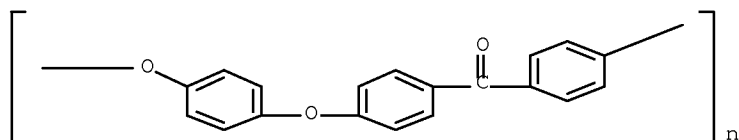
DOCUMENT TYPE: Patent

LANGUAGE: German

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

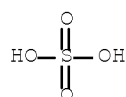
| PATENT NO.                                                                                                   | KIND                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | DATE     | APPLICATION NO.  | DATE              |
|--------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|------------------|-------------------|
| -----                                                                                                        | ----                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | -----    | -----            |                   |
| EP 1191621                                                                                                   | A2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 20020327 | EP 2001-113339   | 200106<br>01      |
|                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |          | <--              |                   |
| EP 1191621                                                                                                   | A3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 20050323 |                  |                   |
| EP 1191621                                                                                                   | B1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 20100324 |                  |                   |
| R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC,<br>PT, IE, SI, LT, LV, FI, RO, CY, TR, AL, MK |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |          |                  |                   |
| DE 10047551                                                                                                  | A1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 20020418 | DE 2000-10047551 | 200009<br>22      |
|                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |          | <--              |                   |
| DE 10047551                                                                                                  | B4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 20040408 |                  |                   |
| AT 462205                                                                                                    | T                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 20100415 | AT 2001-113339   | 200106<br>01      |
|                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |          | <--              |                   |
| ES 2339216                                                                                                   | T3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 20100518 | ES 2001-113339   | 200106<br>01      |
|                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |          | <--              |                   |
| PRIORITY APPLN. INFO.:                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |          | DE 2000-10047551 | A<br>200009<br>22 |
|                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |          | <--              |                   |
| AB                                                                                                           | Inorganically modified organic polymer <del>membranes</del> , especially for direct-methanol <del>fuel cells</del> , consist of an organic polymer, preferably a sulfonated polymer (i.e., a polyether ether ketone), that contains a finely divided and dispersed inorg. phase. The <del>membranes</del> are synthesized by: (1) preparation of the sulfonated polymer (e.g., by sulfonation of the polymer, with SO <sub>3</sub> , (CH <sub>3</sub> ) <sub>3</sub> SiSO <sub>3</sub> Cl, or H <sub>2</sub> SO <sub>4</sub> ), (2) incorporating a Zr alkoxide, a Ti alkoxide, or a Si alkoxide into the polymer solution with hydrolysis to the corresponding oxide, (3) adding an inorg. phosphate to the casting solution, (4) adding phosphoric acid to the casting solution to form a dispersion of the inorg. phosphate. This <del>membrane</del> offers a low methanol and water permeability and simultaneously a high proton conductivity as well as a high mech. stability. |          |                  |                   |
| IT                                                                                                           | 31694-16-3DP, PEEK, sulfonated, reaction products with aminosilanes and metal alkoxides<br>( <del>membranes</del> ; inorganically modified sulfonated organic polymer <del>membranes</del> for direct-methanol <del>fuel cells</del> )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |          |                  |                   |
| RN                                                                                                           | 31694-16-3 HCA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |          |                  |                   |
| CN                                                                                                           | Poly(oxy-1,4-phenyleneoxy-1,4-phenylenecarbonyl-1,4-phenylene) (CA INDEX NAME)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |          |                  |                   |



IT 7664-93-9, Sulfuric acid, uses  
(sulfonating agent; inorganically modified sulfonated organic  
polymer membranes for direct-methanol fuel  
cells)

RN 7664-93-9 HCA

CN Sulfuric acid (CA INDEX NAME)



IPCI H01M0008-10 [I,C]; H01M0008-10 [I,A]; C08J0005-20 [I,C]; C08J0005-22  
[I,A]; H01M0008-02 [I,C]; H01M0008-02 [I,A]

IPCR H01M0008-10 [I,C]; H01M0008-10 [I,A]; C08J0005-20 [I,C]; C08J0005-22  
[I,A]; H01M0008-02 [I,C]; H01M0008-02 [I,A]

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38

ST sulfonated inorg oxide modified polymer membrane  
fuel cell; polyether polyketone sulfonated inorg  
oxide membrane fuel cell; PEEK  
sulfonated inorg oxide membrane fuel  
cell; zirconium phosphate oxide polymer membrane  
fuel cell

IT Titanates  
Zirconates

(alkoxides, reaction products with modified sulfonated organic  
polymers; inorganically modified sulfonated organic polymer  
membranes for direct-methanol fuel  
cells)

IT Silanes  
(alkoxy, reaction products with modified sulfonated organic  
polymers; inorganically modified sulfonated organic polymer  
membranes for direct-methanol fuel  
cells)

IT Silanes  
(amino, reaction products with modified sulfonated organic polymers,  
hydrolyzed, membranes; inorganically modified  
sulfonated organic polymer membranes for direct-methanol  
fuel cells)

IT Fuel cells  
(direct-methanol; inorganically modified sulfonated organic polymer  
membranes for direct-methanol fuel  
cells)

IT Fuel cell separators  
(inorganically modified sulfonated organic polymer membranes  
for direct-methanol fuel cells)



October 25, 2010

10/551,576

213

|      |  |  |  |                |     |
|------|--|--|--|----------------|-----|
| Anon |  |  |  | DE 19909930 A1 | HCA |
| Anon |  |  |  | US 6059943 A   | HCA |
| Anon |  |  |  | WO 9811614 A1  | HCA |

OS.CITING REF COUNT: 2 THERE ARE 2 CAPLUS RECORDS THAT CITE THIS RECORD (2 CITINGS)

----- (BALANCE OF REFS FROM CLAIM 1 NOT IN OTHER CATEGORIES) -----

=> D L100 1-9 IBIB ABS HITSTR HITIND RETABLE

L100 ANSWER 1 OF 9 HCA COPYRIGHT 2010 ACS on STN  
 ACCESSION NUMBER: 146:522662 HCA Full-text  
 TITLE: Ether nitrile copolymers containing sulfonic acid groups for PEM (polymer electrolyte membrane) application  
 INVENTOR(S): Guiver, Michael D.; Gao, Yan; Robertson, Gilles P.  
 PATENT ASSIGNEE(S): National Research Council of Canada, Can.  
 SOURCE: Can. Pat. Appl., 110 pp.  
 CODEN: CPXXEB  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

| PATENT NO.             | KIND | DATE     | APPLICATION NO. | DATE        |
|------------------------|------|----------|-----------------|-------------|
| -----                  | ---- | -----    | -----           |             |
| CA 2527445             | A1   | 20070518 | CA 2005-2527445 | 20051118    |
|                        |      |          | <--             |             |
| US 20070292731         | A1   | 20071220 | US 2005-281584  | 20051118    |
|                        |      |          | <--             |             |
| US 7645856             | B2   | 20100112 |                 |             |
| PRIORITY APPLN. INFO.: |      |          | US 2004-628910P | T0 20041119 |
|                        |      |          | <--             |             |

ASSIGNMENT HISTORY FOR US PATENT AVAILABLE IN LSUS DISPLAY FORMAT

AB Ether nitrile copolymers containing sulfonic acid groups, including wholly aromatic poly(aryl ether ether nitrile)s containing sulfonic acid groups (SPAEEEN)s, and poly(phthalazinone ether ketone nitrile) copolymers containing sulfonic acid groups (SPPEKN)s, intended for fuel cells applications as proton conducting membrane materials, were prepared

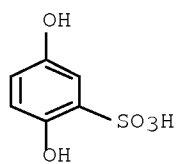
IT ~~851869-50-6P~~, 4,4'-Biphenol-2,6-difluorobenzonitrile-potassium 2,5-dihydroxybenzenesulfonate copolymer ~~936855-30-0P~~, 2,6-Difluorobenzonitrile-hydroquinone-hydroquinonesulfonic acid copolymer (polymer electrolyte membrane; manufacture of ether nitrile copolymers containing sulfonic acid groups for PEM application)

RN 851869-50-6 HCA

CN Benzenesulfonic acid, 2,5-dihydroxy-, potassium salt (1:1), polymer with [1,1'-biphenyl]-4,4'-diol and 2,6-difluorobenzonitrile (CA INDEX NAME)

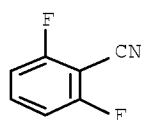
CM 1

CRN 21799-87-1  
CMF C6 H6 O5 S . K



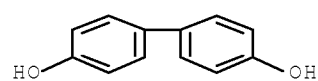
CM 2

CRN 1897-52-5  
CMF C7 H3 F2 N



CM 3

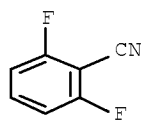
CRN 92-88-6  
CMF C12 H10 O2



RN 936855-30-0 HCA  
CN Benzenesulfonic acid, 2,5-dihydroxy-, polymer with 1,4-benzenediol  
and 2,6-difluorobenzonitrile (CA INDEX NAME)

CM 1

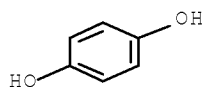
CRN 1897-52-5  
CMF C7 H3 F2 N



CM 2

CRN 123-31-9

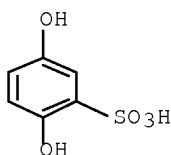
CMF C6 H6 O2



CM 3

CRN 88-46-0

CMF C6 H6 O5 S



IPCI C08G0065-40 [I,A]; C08G0065-00 [I,C\*]; C08J0005-22 [I,A];  
 C08J0005-20 [I,C\*]  
 IPCR C08G0065-00 [I,C]; C08G0065-40 [I,A]; C08J0005-20 [I,C]; C08J0005-22  
 [I,A]  
 CC 37-3 (Plastics Manufacture and Processing)  
 Section cross-reference(s): 52  
 ST ~~fuel cell membrane~~ ether nitrile  
 copolymer; sulfonic acid group ether nitrile copolymer;  
 polyphthalazinone ether ketone nitrile sulfonic acid; PEM  
~~fuel cell~~ sulfonic acid ether nitrile copolymer;  
 polymer electrolyte ~~membrane~~ fuel cell  
~~membrane~~  
 IT Fuel cell separators  
 Polymer electrolytes  
 (manufacture of ether nitrile copolymers containing sulfonic acid groups  
 for PEM application)  
 IT ~~851869-50-6P~~, 4,4'-Biphenol-2,6-difluorobenzonitrile-  
 potassium 2,5-dihydroxybenzenesulfonate copolymer 879296-39-6P,  
 4,4'-Biphenol;2,6-difluorobenzonitrile;sodium  
 2,8-dihydroxynaphthalene-6-sulfonate copolymer ~~936855-30-0P~~  
 , 2,6-Difluorobenzonitrile-hydroquinone-hydroquinonesulfonic acid  
 copolymer  
 (polymer electrolyte ~~membrane~~; manufacture of ether nitrile  
 copolymers containing sulfonic acid groups for PEM application)

L100 ANSWER 2 OF 9 HCA COPYRIGHT 2010 ACS on STN  
 ACCESSION NUMBER: 145:106788 HCA Full-text  
 TITLE: ~~Membrane-electrode~~ assembly  
 for fuel cell  
 INVENTOR(S): Otsuki, Toshitaka; Kaneoka, Takeshi; Iguchi,

October 25, 2010

10/551,576

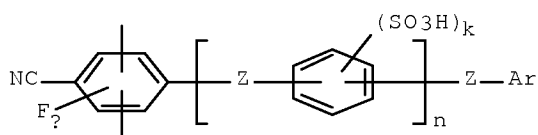
216

PATENT ASSIGNEE(S): Masaru; Soma, Hiroshi  
 SOURCE: Jsr Ltd., Japan; Honda Motor Co., Ltd.  
 Jpn. Kokai Tokkyo Koho, 34 pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

| PATENT NO.    | KIND | DATE     | APPLICATION NO. | DATE     |
|---------------|------|----------|-----------------|----------|
| -----         | ---- | -----    | -----           |          |
| JP 2006172861 | A    | 20060629 | JP 2004-362662  | 20041215 |

PRIORITY APPLN. INFO.: <-- JP 2004-362662 20041215  
 <--

GI

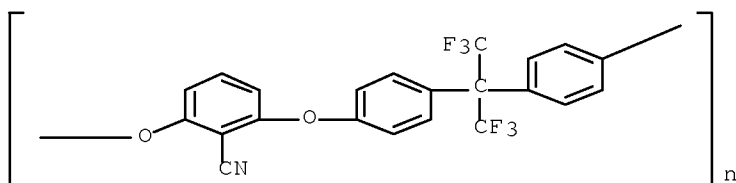


AB The assembly has a solid polymer electrolyte ~~membrane~~ bonded between a pair of ~~electrodes~~ containing a gas diffusion layer and a catalyst layer contacting the electrolyte ~~membrane~~; where the electrolyte ~~membrane~~ comprising a sulfonated polyarylene having structural unit I [Z = -CO, -SO<sub>2</sub>, -SO, -CONH, -COO, -(CF<sub>2</sub>)<sub>i</sub>, -C(CF<sub>3</sub>)<sub>2</sub>, -(CH<sub>2</sub>)<sub>j</sub>, -C(CH<sub>3</sub>)<sub>2</sub>, -O, -S, and/or direct bond; i = integer 1-10; j = integer 1-10; Ar = aromatic group with -SO<sub>3</sub>H substituent; m = 1 or 2; n = integer 0-10; and k = integer 1-4].

IT 193410-37-6  
 (electrolyte ~~membranes~~ containing sulfonated polyarylenes for ~~membrane-electrode~~ assemblies in fuel cells)

RN 193410-37-6 HCA

CN Poly[oxy(2-cyano-1,3-phenylene)oxy-1,4-phenylene[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]-1,4-phenylene] (CA INDEX NAME)



IPCI H01M0008-02 [I,A]; H01M0008-10 [N,A]



IPCR H01M0008-02 [I,A]; H01M0008-02 [I,C]; H01M0008-10 [N,C]; H01M0008-10 [N,A]

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST fuel cell electrode electrolyte  
membrane sulfonated polyarylene

IT Polyethers, uses  
(cardo; electrolyte membranes containing sulfonated polyarylenes for membrane-electrode assemblies in fuel cells)

IT Fuel cell electrodes  
Fuel cell electrolytes  
Polymer electrolytes  
(electrolyte membranes containing sulfonated polyarylenes for membrane-electrode assemblies in fuel cells)

IT Carbon black, uses  
Fluoropolymers, uses  
(electrolyte membranes containing sulfonated polyarylenes for membrane-electrode assemblies in fuel cells)

IT Polyethers, uses  
(fluorine-containing; electrolyte membranes containing sulfonated polyarylenes for membrane-electrode assemblies in fuel cells)

IT Polyketones  
(polyether-, fluorine-containing; electrolyte membranes containing sulfonated polyarylenes for membrane-electrode assemblies in fuel cells)

IT Fluoropolymers, uses  
(polyether-; electrolyte membranes containing sulfonated polyarylenes for membrane-electrode assemblies in fuel cells)

IT Fluoropolymers, uses  
(polyether-polyketone-; electrolyte membranes containing sulfonated polyarylenes for membrane-electrode assemblies in fuel cells)

IT Cardo polymers  
(polyethers; electrolyte membranes containing sulfonated polyarylenes for membrane-electrode assemblies in fuel cells)

IT Polyethers, uses  
(polyketone-, fluorine-containing; electrolyte membranes containing sulfonated polyarylenes for membrane-electrode assemblies in fuel cells)

IT 7440-06-4, Platinum, uses  
(electrolyte membranes containing sulfonated polyarylenes for membrane-electrode assemblies in fuel cells)

IT 9002-84-0, PTFE  
(electrolyte membranes containing sulfonated polyarylenes for membrane-electrode assemblies in fuel cells)

IT 895145-23-0D, hydrolyzed 895145-26-3D, hydrolyzed 895145-28-5D, hydrolyzed  
(electrolyte membranes containing sulfonated polyarylenes for membrane-electrode assemblies in fuel cells)

IT 69266-28-0 122325-09-1 193410-36-5 193410-37-6  
849729-09-5 895145-18-3  
(electrolyte membranes containing sulfonated

polyarylenes for membrane-electrode  
assemblies in fuel cells)

L100 ANSWER 3 OF 9 HCA COPYRIGHT 2010 ACS on STN  
ACCESSION NUMBER: 145:66289 HCA Full-text  
TITLE: Membrane-electrode joints  
for polymer-electrolyte fuel  
cells, and same fuel  
cell system  
INVENTOR(S): Kim, Hee Tak; Park, Yeong Mi; Yoon, Hae Kwon  
PATENT ASSIGNEE(S): Samsung SDI Co., Ltd., S. Korea  
SOURCE: Jpn. Kokai Tokkyo Koho, 17 pp.  
CODEN: JKXXAF  
DOCUMENT TYPE: Patent  
LANGUAGE: Japanese  
FAMILY ACC. NUM. COUNT: 1  
PATENT INFORMATION:

| PATENT NO.     | KIND | DATE     | APPLICATION NO. | DATE         |
|----------------|------|----------|-----------------|--------------|
| JP 2006156397  | A    | 20060615 | JP 2005-343956  | 200511<br>29 |
| KR 2006059455  | A    | 20060602 | KR 2004-98553   | 200411<br>29 |
| US 20060141314 | A1   | 20060629 | US 2005-291102  | 200511<br>29 |
| US 7625650     | B2   | 20091201 | KR 2004-98553   | 200411<br>29 |

# ASSIGNMENT HISTORY FOR US PATENT AVAILABLE IN LSUS DISPLAY FORMAT

AB The joints employs block polymer electrolyte films constituted by hydrophobic blocks and hydrophillic blocks. The joints show high physicochem. stability and hydrogen ion conductivity

IT 891483-30-0D, sulfonated  
(membrane electrolytes; fuel cell  
membrane-electrode joints containing  
hydrophobic-hydrophillic block copolymers)

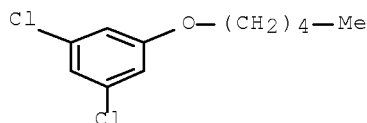
RN 891483-30-0 HCA

CN Benzoic acid, 4-[4-(4-hydroxyphenoxy)phenoxy]-, polymer with  
1,3-dichloro-5-(pentyloxy)benzene, block (9CI) (CA INDEX NAME)

CM 1

CRN 891483-29-7

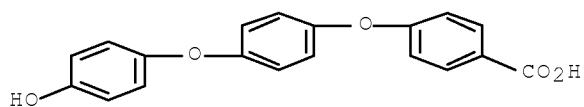
CMF C11 H14 C12 O



CM 2

CRN 142753-98-8

CMF C19 H14 O5



IT 891483-28-6DP, sulfonated  
 (membrane electrolytes; fuel cell  
 membrane-electrode joints containing  
 hydrophobic-hydrophillic block copolymers)

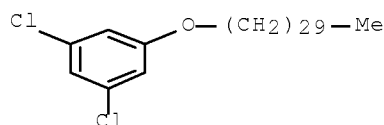
RN 891483-28-6 HCA

CN Benzoic acid, 4-[4-(4-hydroxyphenoxy)phenoxy]-, polymer with  
 1,3-dichloro-5-(triacontyloxy)benzene, block (9CI) (CA INDEX NAME)

CM 1

CRN 891483-27-5

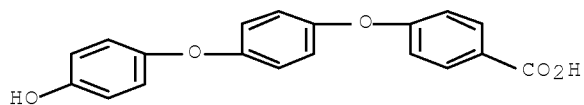
CMF C36 H64 Cl2 O



CM 2

CRN 142753-98-8

CMF C19 H14 O5



IPCI H01M0008-02 [I,A]; H01M0008-10 [I,A]; C08J0005-22 [I,A]; C08J0005-20  
 [I,C\*]; H01B0001-06 [N,A]

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 Section cross-reference(s): 38

ST fuel cell electrolyte hydrophobic hydrophillic  
 block copolymer

IT Fuel cell electrolytes

Polyelectrolytes  
(fuel cell membrane-electrode joints containing hydrophobic-hydrophillic block copolymers)

IT Polyketones  
(polyether-, block, sulfonated, membrane electrolytes; fuel cell membrane-electrode joints containing hydrophobic-hydrophillic block copolymers)

IT Polyethers, uses  
(polyketone-, block, sulfonated, membrane electrolytes; fuel cell membrane-electrode joints containing hydrophobic-hydrophillic block copolymers)

IT Fuel cells  
(polymer electrolyte; fuel cell membrane-electrode joints containing hydrophobic-hydrophillic block copolymers)

IT 891483-30-0D, sulfonated  
(membrane electrolytes; fuel cell membrane-electrode joints containing hydrophobic-hydrophillic block copolymers)

IT 891483-28-6DP, sulfonated  
(membrane electrolytes; fuel cell membrane-electrode joints containing hydrophobic-hydrophillic block copolymers)

OS.CITING REF COUNT: 1 THERE ARE 1 CAPLUS RECORDS THAT CITE THIS RECORD (2 CITINGS)

L100 ANSWER 4 OF 9 HCA COPYRIGHT 2010 ACS on STN

ACCESSION NUMBER: 143:327214 HCA Full-text

TITLE: Polymer electrolyte membranes from novel sulfonated polyimides for direct methanol fuel cell

AUTHOR(S): Yin, Yan; Yamada, Otoo; Fang, Jianhua; Tanaka, Kazuhiro; Kita, Hidetoshi; Okamoto, Ken-ichi

CORPORATE SOURCE: Department of Advanced Materials Science and Engineering, Faculty of Engineering, Yamaguchi University, Ube, Yamaguchi, 755-8611, Japan

SOURCE: Transactions of the Materials Research Society of Japan (2004), 29(3), 1035-1038  
CODEN: TMRJE3; ISSN: 1382-3469

PUBLISHER: Materials Research Society of Japan

DOCUMENT TYPE: Journal

LANGUAGE: English

AB A series of novel sulfonated polyimides (SPIs) were prepared from 1,4,5,8-naphthalenetetracarboxylic dianhydride (NTDA), sulfonated diamines such as bis(3-sulfopropoxy) benzidine (BSPB) and 4,4'-bis(4-amino-phenoxy)biphenyl-3,3'-disulfonic acid (BAPBDS), and common nonsulfonated diamine monomers. Membranes were prepared by solution casting from m-cresol. Proton conductivity was measured as functions of relative humidity (RH) and water volume fraction. These SPIs showed high proton conductivities at high RHs (>80%), which were comparable to or higher than those of Nafion 117. BSPB-based SPIs displayed percolation thresholds slightly higher than that of Nafion and lower than that of BAPBDS-based SPI. Methanol permeation behavior of these SPI membranes was investigated by liquid-liquid permeation method. Most of the SPI membranes displayed lower methanol permeabilities than those of Nafion membrane at 30 and 50°C. As a result, the ratio of proton conductivity ( $\sigma$ ) to methanol permeability (PM),  $\Phi$ , for these SPI membranes was much larger than that, of Nafion, indicating great potential for direct methanol fuel cell application.

IT 865486-35-7

(polymer electrolyte ~~membranes~~ from novel sulfonated polyimides for direct methanol ~~fuel cell~~)

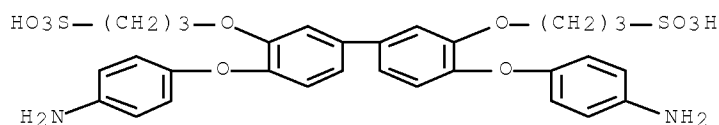
RN 865486-35-7 HCA

CN 1-Propanesulfonic acid, 3,3'-[[4,4'-(4-aminophenoxy)[1,1'-biphenyl]-3,3'-diyl]bis(oxy)]-, polymer with [2]benzopyrano[6,5,4-def][2]benzopyran-1,3,6,8-tetrone and 4,4'-[[1,1'-biphenyl]-4,4'-diylbis(oxy)]bis[benzenamine] (9CI) (CA INDEX NAME)

CM 1

CRN 865486-34-6

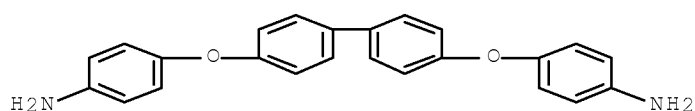
CMF C30 H32 N2 O10 S2



CM 2

CRN 13080-85-8

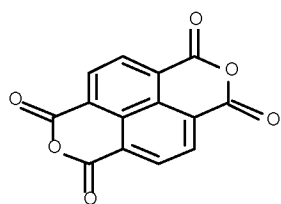
CMF C24 H20 N2 O2



CM 3

CRN 81-30-1

CMF C14 H4 O6



CC 38-3 (Plastics Fabrication and Uses)

Section cross-reference(s): 52

ST polymer electrolyte ~~membrane~~ sulfonated polyimide methanol ~~fuel cell~~

IT Permeation

(of methanol; polymer electrolyte ~~membranes~~ from novel

- sulfonated polyimides for direct methanol fuel cell)
- IT Sorption  
(of water vapor; polymer electrolyte membranes from novel sulfonated polyimides for direct methanol fuel cell)
- IT Polyimides, uses  
(polyether-, sulfo-containing; polymer electrolyte membranes from novel sulfonated polyimides for direct methanol fuel cell)
- IT Polysulfones, uses  
(polyimide-, sulfo group-containing; polymer electrolyte membranes from novel sulfonated polyimides for direct methanol fuel cell)
- IT Polyethers, uses  
(polyimide-, sulfo-containing; polymer electrolyte membranes from novel sulfonated polyimides for direct methanol fuel cell)
- IT Fuel cell separators  
Membranes, nonbiological  
Polymer electrolytes  
(polymer electrolyte membranes from novel sulfonated polyimides for direct methanol fuel cell)
- IT Polyimides, uses  
(polysulfone-, sulfo group-containing; polymer electrolyte membranes from novel sulfonated polyimides for direct methanol fuel cell)
- IT Ionic conductivity  
(proton; polymer electrolyte membranes from novel sulfonated polyimides for direct methanol fuel cell)
- IT Polyimides, uses  
(sulfo group-containing; polymer electrolyte membranes from novel sulfonated polyimides for direct methanol fuel cell)
- IT 500295-68-1, 1,4,5,8-Naphthalenetetracarboxylic dianhydride-4,4'-bis(4-aminophenoxy)biphenyl-3,3'-disulfonic acid copolymer 500295-69-2 648900-41-8, 1,4,5,8-Naphthalenetetracarboxylic dianhydride-bis(2-sulfopropoxy)benzidine copolymer 648900-42-9, 1,4,5,8-Naphthalenetetracarboxylic dianhydride-bis(3-sulfopropoxy)benzidine copolymer 696615-46-0 696615-88-0 852409-04-2 852409-06-4 865486-32-4 865486-33-5 865486-35-7  
(polymer electrolyte membranes from novel sulfonated polyimides for direct methanol fuel cell)
- IT 67-56-1, Methanol, uses  
(polymer electrolyte membranes from novel sulfonated polyimides for direct methanol fuel cell)

## RETABLE

| Referenced Author | Year  | VOL   | PG    | Referenced Work |      |
|-------------------|-------|-------|-------|-----------------|------|
| Referenced        |       |       |       |                 |      |
| (RAU)             | (RPY) | (RVL) | (RPG) | (RWK)           | File |

|       |   |       |   |       |   |       |   |       |   |       |
|-------|---|-------|---|-------|---|-------|---|-------|---|-------|
| ===== | + | ===== | + | ===== | + | ===== | + | ===== | + | ===== |
|-------|---|-------|---|-------|---|-------|---|-------|---|-------|

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|              |      |       |     |                      |     |
|--------------|------|-------|-----|----------------------|-----|
| Acres, G     | 2001 | 100   | 60  | J Power Sources      | HCA |
| Alberti, G   | 2001 | 185   | 73  | J Membr Sci          | HCA |
| Besse, S     | 2002 | 5     | 109 | J New Mat Electroche | HCA |
| Cornet, N    | 2000 | 3     | 33  | J New Mat Electroche | HCA |
| Edmondson, C | 2002 | 152-1 | 355 | Solid State Ionics   | HCA |

|                     |      |     |      |                             |     |
|---------------------|------|-----|------|-----------------------------|-----|
| Fang, J             | 2002 | 35  | 9022 | Macromolecules              | HCA |
| Genies, C           | 2001 | 42  | 359  | Polymer                     | HCA |
| Genova-Dimitrova, P | 2001 | 185 | 59   | J Membr Sci                 | HCA |
| Guo, X              | 2002 | 35  | 6707 | Macromolecules              | HCA |
| Kim, H              | 2001 | 42  | 486  | Polymer Preprints (A        | HCA |
| Kim, J              | 2002 | 207 | 129  | J Membr Sci                 | HCA |
| Kreuer, K           | 2001 | 185 | 29   | J Membr Sci                 | HCA |
| Pivovar, B          | 1999 | 154 | 155  | J Membr Sci                 | HCA |
| Savadogo, O         | 1998 | 1   | 47   | J New Mater Electrochem Soc | HCA |
| Sone, Y             | 1996 | 143 | 1254 | J Electrochem Soc           | HCA |
| Staiti, P           | 2001 | 188 | 71   | J Membr Sci                 | HCA |
| Watari, T           | 2003 | 29  | 165  | Kagaku Kogaku Ronbun        | HCA |
| Yin, Y              | 2003 | 32  | 328  | Chem Letters                | HCA |
| Yin, Y              | 2003 | 44  | 4509 | Polymer                     | HCA |

L100 ANSWER 5 OF 9 HCA COPYRIGHT 2010 ACS on STN  
 ACCESSION NUMBER: 143:100266 HCA Full-text  
 TITLE: Proton-conductive electrolyte and fuel cell  
 INVENTOR(S): Muneuchi, Atsuo; Nishide, Hiroyuki; Masuyama, Toru  
 PATENT ASSIGNEE(S): Samsung SDI Co., Ltd., S. Korea  
 SOURCE: Jpn. Kokai Tokkyo Koho, 10 pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 2  
 PATENT INFORMATION:

| PATENT NO.             | KIND | DATE     | APPLICATION NO. | DATE       |
|------------------------|------|----------|-----------------|------------|
| -----                  | ---- | -----    | -----           |            |
| JP 2005171087          | A    | 20050630 | JP 2003-413247  | 20031211   |
|                        |      |          | <--             |            |
| US 20050142412         | A1   | 20050630 | US 2004-8611    | 20041210   |
|                        |      |          | <--             |            |
| PRIORITY APPLN. INFO.: |      |          | JP 2003-413247  | A 20031211 |
|                        |      |          | <--             |            |
|                        |      |          | KR 2004-102209  | A 20041207 |
|                        |      |          | <--             |            |

# ASSIGNMENT HISTORY FOR US PATENT AVAILABLE IN LSUS DISPLAY FORMAT

AB The electrolytes contains a polyphenylene oxide main chain and a sulfonatoalkoxy group side chain. The fuel cell has an electrolyte membrane, containing the above electrolyte, between a pair of electrodes; where a part of the electrode contains the electrolyte. The electrolyte is preferably manufactured by treatment of a catechol with an alkane sultone and oxidative polymerization of the resulting sulfonatoalkoxyphenol. In the fuel cell, the electrolyte is used for the electrolyte membrane and in electrodes. The electrolytes show good heat resistance and are capable of forming films by casting, etc.

IT 856680-95-ODF, hydrolyzed  
 (proton-conductive sulfonatoalkoxy-containing polyphenylene

oxide electrolytes showing good heat resistance for fuel  
cells)

RN 856680-95-0 HCA

CN 1-Propanesulfonic acid, 3-[2-hydroxy-3(or 6)-methylphenoxy]-,  
disodium salt, homopolymer (9CI) (CA INDEX NAME)

CM 1

CRN 856680-94-9

CMF C10 H14 O5 S

CCI IDS

CM 2

CRN 15909-83-8

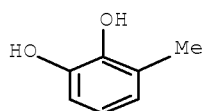
CMF C3 H8 O4 S

HO—(CH<sub>2</sub>)<sub>3</sub>—SO<sub>3</sub>H

CM 3

CRN 488-17-5

CMF C7 H8 O2



IPCI C08G0065-44 [ICM,7]; C08G0065-00 [ICM,7,C\*]; H01B0001-06 [ICS,7];  
H01M0008-02 [ICS,7]; H01M0008-10 [ICS,7]

IPCR C08G0065-00 [I,C\*]; C08G0065-44 [I,A]; H01B0001-06 [I,A];  
H01B0001-06 [I,C\*]; H01M0008-02 [I,A]; H01M0008-02 [I,C\*];  
H01M0008-10 [I,A]; H01M0008-10 [I,C\*]

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 25, 35, 38

ST proton conductive sulfonatoalkoxy polyphenylene oxide fuel  
cell electrode; heat resistance proton conductive  
sulfonatoalkoxy polyphenylene oxide; polymer electrolyte  
fuel cell sulfonatoalkoxy polyphenylene oxide;  
oxidative polymn sulfonatoalkoxyphenol fuel cell  
electrolyte

IT Fuel cells

(polymer electrolyte; proton-conductive sulfonatoalkoxy-containing  
polyphenylene oxide electrolytes showing good heat resistance for  
fuel cells)

IT Fuel cell electrodes

Fuel cell electrolytes

Polymer electrolytes

(proton-conductive sulfonatoalkoxy-containing polyphenylene oxide  
electrolytes showing good heat resistance for fuel  
cells)



IT Ionic conductors  
 (protonic; proton-conductive sulfonatoalkoxy-containing polyphenylene oxide electrolytes showing good heat resistance for fuel cells)

IT Polyoxyphenylenes  
 (sulfo-containing; proton-conductive sulfonatoalkoxy-containing polyphenylene oxide electrolytes showing good heat resistance for fuel cells)

IT 856680-95-0DP, hydrolyzed 856705-16-3DP, hydrolyzed  
 856859-88-6DP, hydrolyzed 856859-94-4DP, hydrolyzed  
 (proton-conductive sulfonatoalkoxy-containing polyphenylene oxide electrolytes showing good heat resistance for fuel cells)

IT 856705-15-2P  
 (proton-conductive sulfonatoalkoxy-containing polyphenylene oxide electrolytes showing good heat resistance for fuel cells)

IT 120-80-9, Catechol, reactions 488-17-5, 3-Methylcatechol  
 1120-71-4, 1,3-Propanesultone  
 (proton-conductive sulfonatoalkoxy-containing polyphenylene oxide electrolytes showing good heat resistance for fuel cells)

L100 ANSWER 6 OF 9 HCA COPYRIGHT 2010 ACS on STN  
 ACCESSION NUMBER: 142:339074 HCA Full-text  
 TITLE: Crosslinked sulfonated polyimides and their  
 manufacture for polymer electrolyte  
 membranes in fuel  
 cells

INVENTOR(S): Okamoto, Kenichi; Kita, Hidetoshi; Yamada,  
 Nario; Yin, Yan; Hirano, Tetsuji; Kiuchi,  
 Masayuki

PATENT ASSIGNEE(S): Yamaguchi Technology Licensing Organization  
 Ltd., Japan; Ube Industries, Ltd.

SOURCE: Jpn. Kokai Tokkyo Koho, 27 pp.  
 CODEN: JKXXAF

DOCUMENT TYPE: Patent

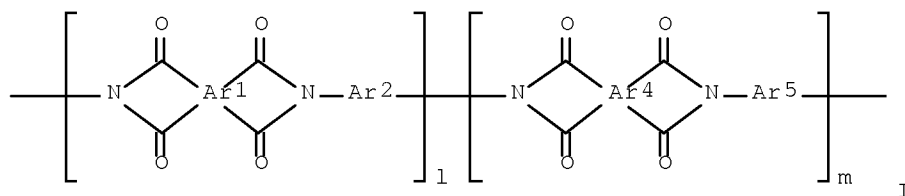
LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

| PATENT NO.             | KIND | DATE     | APPLICATION NO. | DATE               |
|------------------------|------|----------|-----------------|--------------------|
| -----                  | ---- | -----    | -----           |                    |
| JP 2005082726          | A    | 20050331 | JP 2003-317413  | 200309<br>09       |
|                        |      |          | <--             |                    |
| JP 4554179             | B2   | 20100929 |                 |                    |
| JP 2010235946          | A    | 20101021 | JP 2010-100085  | 201004<br>23       |
|                        |      |          | <--             |                    |
| PRIORITY APPLN. INFO.: |      |          | JP 2003-317413  | A3<br>200309<br>09 |
|                        |      |          | <--             |                    |

GI



AB The polyimides are crosslinked products of acid-terminated sulfonated polyimides I (Ar1, Ar4 = aromatic ring-containing tetravalent residue; Ar2 = sulfo- or sulfo derivative-substituted divalent aromatic ring residue; Ar5 = sulfo- or sulfo derivative-free divalent aromatic ring residue;  $l \geq 1$ ;  $m \geq 0$ ) with  $\geq 3$ -functional aromatic amines. The polyimides are manufactured by (1) reacting Mb mol of aromatic diamines with Ma mol of aromatic tetracarboxylic acids in mol. ratio Ma/Mb 1.03-1.5 in organic solvents to give organic solvent-soluble aromatic tetracarboxylic acid residue-terminated sulfonated polyimides, (2) adding  $\geq 3$ -functional aromatic amines to the acid-terminated polyimide solns. at  $\leq 100^\circ$  to satisfy approx. equal mol of the terminal acid residues and the amino groups, and (3) heating the mixts. at  $110-350^\circ$  for removal of the solvents. Manufacture of films of the crosslinked sulfonated polyimides by casting or applying the mixts obtained by the above (2) process on supports and heating at  $110-350^\circ$  for solvent removal is also claimed. The polyimides have high ion exchange capacity and proton conductivity and improved water resistance, dimensional change in water absorption, and MeOH permeability.

IT ~~848469-45-4P~~ ~~848469-47-6P~~ ~~848469-48-7P~~  
(crosslinked sulfonated polyimides and their manufacture for polymer electrolyte membranes in fuel cells)

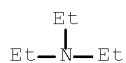
RN 848469-45-4 HCA

CN 1-Propanesulfonic acid, 3,3'-[(4,4'-diamino[1,1'-biphenyl]-2,2'-diyl)bis(oxy)]bis-, polymer with 4,4',4''-[1,3,5-benzenetriyltris(oxy)]tris[benzenamine] and [2]benzopyrano[6,5,4-def][2]benzopyran-1,3,6,8-tetrone, compd. with N,N-diethylethanamine (9CI) (CA INDEX NAME)

CM 1

CRN 121-44-8

CMF C6 H15 N



CM 2

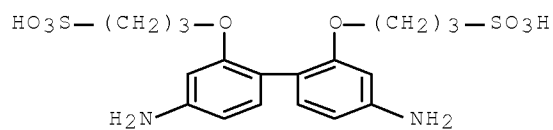
CRN 848469-44-3

CMF (C24 H21 N3 O3 . C18 H24 N2 O8 S2 . C14 H4 O6)x

CCI PMS

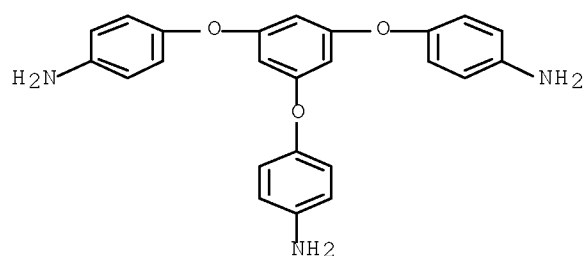
CM 3

CRN 532967-92-3  
CMF C18 H24 N2 O8 S2



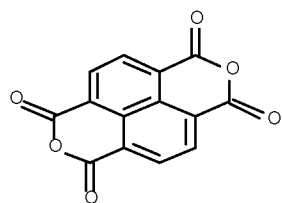
CM 4

CRN 102852-92-6  
CMF C24 H21 N3 O3



CM 5

CRN 81-30-1  
CMF C14 H4 O6

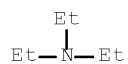


RN 848469-47-6 HCA  
CN 1-Propanesulfonic acid, 3,3'-[(4,4'-diamino[1,1'-biphenyl]-2,2'-diyl)bis(oxy)]bis-, polymer with 4,4',4''-[1,3,5-benzenetriyltris(oxy)]tris[benzenamine], [2]benzopyrano[6,5,4-def][2]benzopyran-1,3,6,8-tetrone and 4,4'-[[1,1'-biphenyl]-4,4'-diylbis(oxy)]bis[benzenamine], compd. with N,N-diethylethanamine (9CI) (CA INDEX NAME)

CM 1

CRN 121-44-8

CMF C6 H15 N



CM 2

CRN 848469-46-5

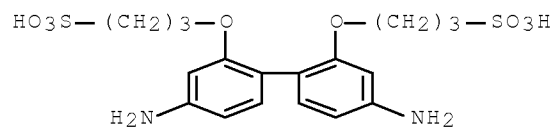
CMF (C24 H21 N3 O3 . C24 H20 N2 O2 . C18 H24 N2 O8 S2 . C14 H4 O6) x

CCI PMS

CM 3

CRN 532967-92-3

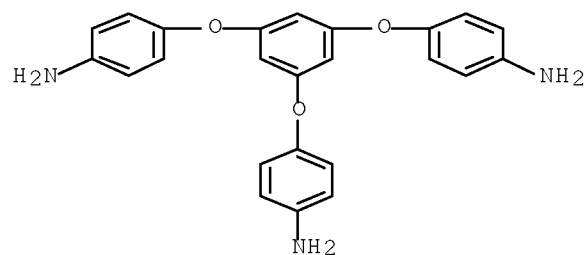
CMF C18 H24 N2 O8 S2



CM 4

CRN 102852-92-6

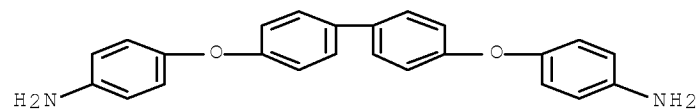
CMF C24 H21 N3 O3



CM 5

CRN 13080-85-8

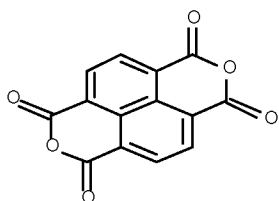
CMF C24 H20 N2 O2



CM 6

CRN 81-30-1

CMF C14 H4 O6



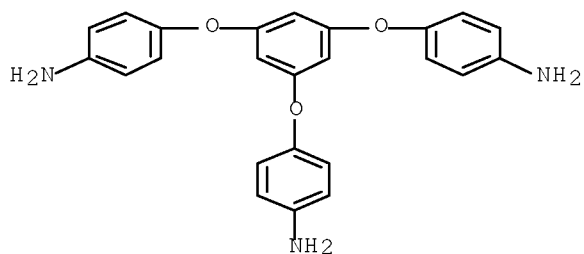
RN 848469-48-7 HCA

CN 1-Propanesulfonic acid, 3,3'-[(4,4'-diamino[1,1'-biphenyl]-3,3'-diyl)bis(oxy)]bis-, polymer with 4,4',4'''-[1,3,5-benzenetriyltris(oxy)]tris[benzenamine] and [2]benzopyrano[6,5,4-def][2]benzopyran-1,3,6,8-tetrone (9CI) (CA INDEX NAME)

CM 1

CRN 102852-92-6

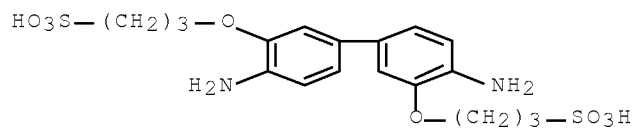
CMF C24 H21 N3 O3



CM 2

CRN 56716-06-4

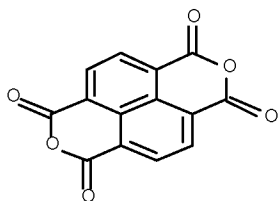
CMF C18 H24 N2 O8 S2



CM 3

CRN 81-30-1

CMF C14 H4 O6



IPCI C08G0073-10 [I,A]; C08G0073-00 [I,C\*]; C08J0003-24 [I,A]  
 IPCR C08G0073-00 [I,C\*]; C08G0073-10 [I,A]; C08J0003-24 [I,A];  
 C08J0003-24 [I,C\*]; H01B0001-06 [I,A]; H01B0001-06 [I,C\*];  
 H01M0008-02 [I,A]; H01M0008-02 [I,C\*]; H01M0008-10 [I,A];  
 H01M0008-10 [I,C\*]  
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 Section cross-reference(s): 38  
 ST crosslinked sulfonated polyimide electrolyte ~~membrane~~  
~~fuel cell~~  
 IT Polymer electrolytes  
 (crosslinked sulfonated polyimides and their manufacture for polymer  
 electrolyte ~~membranes~~ in ~~fuel cells~~  
 )  
 IT Fuel cells  
 (polymer electrolyte; crosslinked sulfonated polyimides and their  
 manufacture for polymer electrolyte ~~membranes~~ in  
~~fuel cells~~)  
 IT Polyimides, uses  
 (sulfo-containing, aromatic amine-crosslinked; crosslinked sulfonated  
 polyimides and their manufacture for polymer electrolyte  
~~membranes~~ in ~~fuel cells~~)  
 IT 848469-45-4P 848469-47-6P 848469-48-7P  
 (crosslinked sulfonated polyimides and their manufacture for  
 polymer electrolyte ~~membranes~~ in ~~fuel~~  
~~cells~~)  
 IT 108-73-6, 1,3,5-Trihydroxybenzene 350-46-9, 4-Fluoronitrobenzene  
 (crosslinker from; crosslinked sulfonated polyimides and their  
 manufacture for polymer electrolyte ~~membranes~~ in  
~~fuel cells~~)  
 IT 102852-92-6P  
 (crosslinker; crosslinked sulfonated polyimides and their manufacture  
 for polymer electrolyte ~~membranes~~ in ~~fuel~~  
~~cells~~)  
 IT 696614-99-0P, Sodium 3-(3'-nitrophenoxy)propanesulfonate  
 696615-10-8P 696615-19-7P  
 (monomer from; crosslinked sulfonated polyimides and their manufacture  
 for polymer electrolyte ~~membranes~~ in ~~fuel~~  
~~cells~~)  
 IT 88-75-5, o-Nitrophenol 554-84-7, m-Nitrophenol 55788-44-8,  
 Sodium 3-bromopropanesulfonate  
 (monomer from; crosslinked sulfonated polyimides and their manufacture  
 for polymer electrolyte ~~membranes~~ in ~~fuel~~  
~~cells~~)

IT 56716-06-4P 532967-92-3P, 2,2'-Bis(3-sulfopropoxy)benzidine  
(monomer; crosslinked sulfonated polyimides and their manufacture for  
polymer electrolyte ~~membranes~~ in fuel  
cells)

L100 ANSWER 7 OF 9 HCA COPYRIGHT 2010 ACS on STN  
ACCESSION NUMBER: 140:149110 HCA Full-text  
TITLE: Protonic acid-containing crosslinkable resins,  
their crosslinked products, and their use in  
fuel cells  
INVENTOR(S): Ishikawa, Junichi; Nakata, Tomoyuki; Fujiyama,  
Akiko; Omi, Katsuhiko; Tamai, Masashi  
PATENT ASSIGNEE(S): Mitsui Chemicals Inc., Japan  
SOURCE: Jpn. Kokai Tokkyo Koho, 78 pp.  
CODEN: JKXXAF  
DOCUMENT TYPE: Patent  
LANGUAGE: Japanese  
FAMILY ACC. NUM. COUNT: 1  
PATENT INFORMATION:

| PATENT NO.    | KIND | DATE     | APPLICATION NO. | DATE         |
|---------------|------|----------|-----------------|--------------|
| -----         | ---- | -----    | -----           |              |
| JP 2004026889 | A    | 20040129 | JP 2002-181632  | 200206<br>21 |

PRIORITY APPLN. INFO.: <-- JP 2002-181632  
200206  
21

AB The resins have crosslinkable groups (e.g., carbonyl, C1-10 alkyl bonded to aromatic ring) and protonic acid groups (e.g., SO<sub>3</sub>H) and can be crosslinked by light, heat, or electron beam. Photocrosslinked products of the resins and fuel cell ion-conducting polymer ~~membranes~~ obtained from the resins or the photocrosslinked products are also claimed. The crosslinked resins have high ion conductivity and MeOH resistance, so that the fuel cells such as DFFC using the ~~membranes~~ have high durability.

IT 515144-54-4P  
(blends with sulfonated polyether-polyketones; protonic  
acid-containing crosslinkable resins for ion-conducting  
~~membranes~~ in fuel cells)

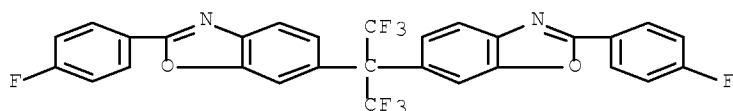
RN 515144-54-4 HCA

CN 1,4-Benzenediol, 2,3,5,6-tetramethyl-, polymer with  
6,6'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[2-(4-  
fluorophenyl)benzoxazole] (CA INDEX NAME)

CM 1

CRN 121778-05-0

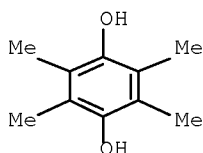
CMF C29 H14 F8 N2 O2



CM 2

CRN 527-18-4

CMF C10 H14 O2



IPCI C08G0069-26 [ICM,7]; C08G0069-00 [ICM,7,C\*]; C08G0073-10 [ICS,7];  
C08G0073-22 [ICS,7]; C08G0073-00 [ICS,7,C\*]; H01B0001-06 [ICS,7];  
H01M0008-02 [ICS,7]; H01M0008-10 [ICS,7]

IPCR C08G0069-00 [I,C\*]; C08G0069-26 [I,A]; C08G0073-00 [I,C\*];  
C08G0073-10 [I,A]; C08G0073-22 [I,A]; H01B0001-06 [I,C\*];  
H01B0001-06 [I,A]; H01M0008-02 [I,C\*]; H01M0008-02 [I,A];  
H01M0008-10 [I,C\*]; H01M0008-10 [I,A]

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 35, 38

ST crosslinkable resin fuel cell ion conductor  
membrane; protonic acid photocrosslinked polymer  
membrane fuel cell; direct methano  
fuel cell

IT Fuel cells  
(DMFC; protonic acid-containing crosslinkable resins for  
ion-conducting membranes in fuel  
cells)

IT Polysulfones, uses  
(blends with sulfo-containing compds.; protonic acid-containing  
crosslinkable resins for ion-conducting membranes in  
fuel cells)

IT Crosslinking  
(photochem.; protonic acid-containing crosslinkable resins for  
ion-conducting membranes in fuel  
cells)

IT Polyketones  
(polyether-, blends with sulfo-containing polymers; protonic  
acid-containing crosslinkable resins for ion-conducting  
membranes in fuel cells)

IT Polyketones  
(polyether-, sulfonated, sodium salts, crosslinked,  
ion-exchanged; protonic acid-containing crosslinkable resins for  
ion-conducting membranes in fuel  
cells)

IT Polyethers, uses  
(polyketone-, blends with sulfo-containing polymers; protonic  
acid-containing crosslinkable resins for ion-conducting  
membranes in fuel cells)

IT Polyethers, uses  
(polyketone-, sulfonated, sodium salts, crosslinked,  
ion-exchanged; protonic acid-containing crosslinkable resins for  
ion-conducting membranes in fuel  
cells)

IT Fuel cell electrolytes  
Ionic conductors



- (protonic acid-containing crosslinkable resins for ion-conducting membranes in fuel cells)
- IT Crosslinking  
(radiochem.; protonic acid-containing crosslinkable resins for ion-conducting membranes in fuel cells)
- IT Polyamides, uses  
Polyimides, uses  
(sulfo-containing; protonic acid-containing crosslinkable resins for ion-conducting membranes in fuel cells)
- IT Polyoxyphenylenes  
(sulfonated, sodium salts, blends with polyether-polyketones, ion-exchanged; protonic acid-containing crosslinkable resins for ion-conducting membranes in fuel cells)
- IT Polybenzoxazoles  
(sulfonated; protonic acid-containing crosslinkable resins for ion-conducting membranes in fuel cells)
- IT Crosslinking  
(thermal; protonic acid-containing crosslinkable resins for ion-conducting membranes in fuel cells)
- IT 25134-01-4DP, Poly(2,6-dimethyl-1,4-phenylene oxide), sulfonated, sodium salt, ion-exchanged  
(assumed monomers, blends with polyether-polyketones; protonic acid-containing crosslinkable resins for ion-conducting membranes in fuel cells)
- IT 515144-61-3DP, ion-exchanged  
(blends with polyamides; protonic acid-containing crosslinkable resins for ion-conducting membranes in fuel cells)
- IT 515144-60-2P  
(blends with polyether-polyketones or anthraquinone; protonic acid-containing crosslinkable resins for ion-conducting membranes in fuel cells)
- IT 24938-67-8DP, Poly(2,6-dimethyl-1,4-phenylene oxide), sulfonated, sodium salt, ion-exchanged 515144-58-8DP, ion-exchanged  
515144-64-6DP, ion-exchanged  
(blends with polyether-polyketones; protonic acid-containing crosslinkable resins for ion-conducting membranes in fuel cells)
- IT 1323-19-9  
(blends with polyether-polyketones; protonic acid-containing crosslinkable resins for ion-conducting membranes in fuel cells)
- IT 515144-51-1DP, ion-exchanged  
(blends with polyimides; protonic acid-containing crosslinkable resins for ion-conducting membranes in fuel cells)
- IT 853-68-9D, ion-exchanged  
(blends with polysulfones; protonic acid-containing crosslinkable resins for ion-conducting membranes in fuel cells)
- IT 515144-56-6P 515144-57-7P  
(blends with sulfo-containing polyimides; protonic acid-containing crosslinkable resins for ion-conducting membranes in fuel cells)
- IT 25897-65-8P, Bisphenol A-4,4'-difluorobenzophenone copolymer

41205-96-3P

(blends with sulfo-containing polymers; protonic acid-containing crosslinkable resins for ion-conducting membranes in fuel cells)

IT 84-65-1, 9,10-Anthracenedione

(blends with sulfo-containing polysulfones; protonic acid-containing crosslinkable resins for ion-conducting membranes in fuel cells)

IT 127669-56-1P

(blends with sulfonated polyamides; protonic acid-containing crosslinkable resins for ion-conducting membranes in fuel cells)

IT 29658-28-4P 87792-34-5P 515144-54-4P

(blends with sulfonated polyether-polyketones; protonic acid-containing crosslinkable resins for ion-conducting membranes in fuel cells)

IT 240405-82-7

(blends with sulfonated polyether-polyketones; protonic acid-containing crosslinkable resins for ion-conducting membranes in fuel cells)

IT 515144-36-2DP, ion-exchanged 515144-37-3DP, ion-exchanged

515144-38-4DP, ion-exchanged 515144-39-5DP, ion-exchanged

515144-41-9DP, ion-exchanged 515144-42-0DP, ion-exchanged

651326-38-4DP, sulfonated 651326-39-5DP, ion-exchanged

651326-40-8DP, ion-exchanged

(protonic acid-containing crosslinkable resins for ion-conducting membranes in fuel cells)

OS.CITING REF COUNT: 1 THERE ARE 1 CAPLUS RECORDS THAT CITE THIS RECORD (1 CITINGS)

L100 ANSWER 8 OF 9 HCA COPYRIGHT 2010 ACS on STN

ACCESSION NUMBER: 138:338636 HCA Full-text

TITLE: Sulfonated six-membered ring polyimides as proton exchange membranes: synthesis and characterization

AUTHOR(S): Gunduz, N.; Inan, T. Y.; Yildiz, E.; McGrath, J. E.

CORPORATE SOURCE: Dep. of Chem. and Cent. for High Performance Polymeric Adhesives and Composites, Virginia Polytechnic Inst. and State Univ., Blacksburg, VA, 24061-0344, USA

SOURCE: Polymeric Materials Science and Engineering (2001), 84, 911-912

CODEN: PMSE DG; ISSN: 0743-0515

PUBLISHER: American Chemical Society

DOCUMENT TYPE: Journal

LANGUAGE: English

AB The utilization of wholly aromatic six-membered ring polyimides containing pendant sulfonic acid functional groups is of interest for solid polymer electrolyte membrane fuel cells (SPEMFC). The ongoing work reported herein describes the synthesis and characterization of high mol. weight random copolymers of sulfonated polyimides that have been prepared from 1,4,5,8-naphthalene tetracarboxylic dianhydride and appropriate wholly aromatic sulfonated/unsulfonated diamines to control the degree of sulfonation on the final polymer. The sulfonated and unsulfonated control polymers were synthesized via high temperature direct polyimidization method using m-cresol as a solvent. Tough, creasible membranes were obtained via solution casting from m-cresol and they were characterized for mol. weight (IV), chemical composition (NMR, FT-IR,) thermal transition behavior (TGA, DSC), water absorption and conductivity measurements. This paper will also describe

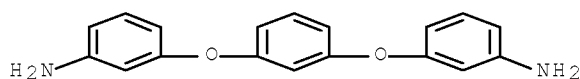
synthesis and characterization of phosphine oxide based sulfonated and unsulfonated diamine monomers and polymers for potential proton exchange membranes for fuel cells.

- IT 518050-65-2P, 1,3-Bis(3-aminophenoxy)benzene-4,4'-  
diaminobiphenyl-2,2'-disulfonic acid-1,4,5,8-naphthalene  
tetracarboxylic dianhydride copolymer  
(preparation and characterization of sulfonated six-membered  
ring polyimides as proton exchange membranes)
- RN 518050-65-2 HCA
- CN [1,1'-Biphenyl]-2,2'-disulfonic acid, 4,4'-diamino-, polymer with  
[2]benzopyrano[6,5,4-def][2]benzopyran-1,3,6,8-tetrone and  
3,3'-[1,3-phenylenebis(oxy)]bis[benzenamine] (9CI) (CA INDEX NAME)

CM 1

CRN 10526-07-5

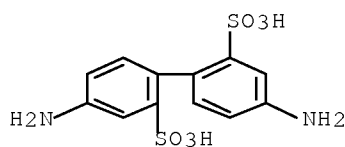
CMF C18 H16 N2 O2



CM 2

CRN 117-61-3

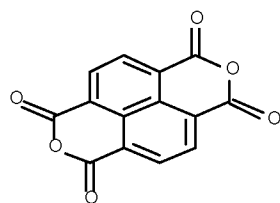
CMF C12 H12 N2 O6 S2



CM 3

CRN 81-30-1

CMF C14 H4 O6



ST sulfonic acid contg polyether polyimide proton exchange  
membrane prepn

IT Polyimides, preparation  
(polyether-, sulfo-containing; preparation and characterization of  
sulfonated six-membered ring polyimides as proton exchange  
membranes)

IT Polyethers, preparation  
(polyimide-, sulfo-containing; preparation and characterization of  
sulfonated six-membered ring polyimides as proton exchange  
membranes)

IT Cation exchange membranes  
(preparation and characterization of sulfonated six-membered ring  
polyimides as proton exchange membranes)

IT 518050-65-2P, 1,3-Bis(3-aminophenoxy)benzene-4,4'-  
diaminobiphenyl-2,2'-disulfonic acid-1,4,5,8-naphthalene  
tetracarboxylic dianhydride copolymer  
(preparation and characterization of sulfonated six-membered  
ring polyimides as proton exchange membranes)

IT 75925-90-5 302554-20-7  
(preparation and characterization of sulfonated six-membered ring  
polyimides as proton exchange membranes)

## RETABLE

| Referenced Author<br>(RAU) | Year<br>(RPY) | VOL<br>(RVL) | PG<br>(RPG) | Referenced Work<br>(RWK) | File |
|----------------------------|---------------|--------------|-------------|--------------------------|------|
|----------------------------|---------------|--------------|-------------|--------------------------|------|

|             |      |    |      |                      |     |
|-------------|------|----|------|----------------------|-----|
| Genies, C   | 2001 | 92 | 359  | Polymer              |     |
| Gunduz, N   | 2000 |    |      | ACS Div Polym Chem P |     |
| Laande, G   | 1997 | 9  | 84   | Chem Mater           |     |
| Mercier, R  | 1999 |    |      | 15th European tec    |     |
| Miyatake, K | 1996 | 29 | 6969 | Macromolecules       | HCA |
| Rusanow, A  | 1994 | 17 | 115  | Advances in Polymer  |     |
| Shobha, H   | 2000 | 41 | 1298 | ACS Div Polym Chem P | HCA |
| Wang, F     | 2000 | 41 | 1401 | ACS Div Polym Chem P | HCA |
| Zhing, Y    | 1999 | 40 | 480  | Polym Chem Polym Pre |     |
| Zhuang, H   | 1998 |    |      | PhD Dissertation, Vi |     |

OS.CITING REF COUNT: 1 THERE ARE 1 CAPLUS RECORDS THAT CITE THIS  
RECORD (1 CITINGS)

L100 ANSWER 9 OF 9 HCA COPYRIGHT 2010 ACS on STN  
ACCESSION NUMBER: 137:281872 HCA Full-text  
TITLE: Improved proton conducting membrane  
from dendrimeric polymers covalently linked into  
a network structure for fuel  
cells

INVENTOR(S): Colombo, Daniel; Krumpelt, Michael; Myers,  
Deborah; Kopasz, John

PATENT ASSIGNEE(S): University of Chicago, USA

SOURCE: PCT Int. Appl., 24 pp.  
CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

| PATENT NO.    | KIND | DATE     | APPLICATION NO. | DATE |
|---------------|------|----------|-----------------|------|
| WO 2002078110 | A2   | 20021003 | WO 2002-US10004 |      |

200203  
27

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WO 2002078110 A3 20031211  
 W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH,  
 CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD,  
 GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ,  
 LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ,  
 NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ,  
 TM, TN, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZM, ZW  
 RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ,  
 BY, KG, KZ, MD, RU, TJ, TM, AT, BE, CH, CY, DE, DK, ES, FI,  
 FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG,  
 CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG  
 US 20030035991 A1 20030220 US 2002-105203

200203  
25

&lt;--

US 6977122 B2 20051220  
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200203  
27

&lt;--

US 20060094792 A1 20060504 US 2005-291254

200512  
01

&lt;--

US 7195835 B2 20070327  
 PRIORITY APPLN. INFO.: US 2001-278979P P

200103  
27

&lt;--

US 2002-105203 A3

200203  
25

&lt;--

WO 2002-US10004 W

200203  
27

&lt;--

## ASSIGNMENT HISTORY FOR US PATENT AVAILABLE IN LSUS DISPLAY FORMAT

AB The invention provides an ion conducting ~~membrane~~ comprising dendrimeric polymers covalently linked into a network structure. The dendrimeric polymers of the invention have acid functional terminal groups and may be covalently linked via linking compds., cross-coupling reactions, or copolymn. reactions. The invention also provides methods for producing the ion conducting ~~membranes~~ and ~~fuel cells~~ made from the ~~membranes~~.

IT 129371-31-9DP, 3,5-Dihydroxybenzyl alcohol homopolymer, ~~methanesulfonate~~  
 (improved proton conducting ~~membrane~~ from dendrimeric polymers covalently linked into network structure for ~~fuel cells~~)

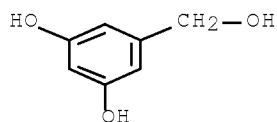
RN 129371-31-9 HCA

CN 1,3-Benzenediol, 5-(hydroxymethyl)-, homopolymer (CA INDEX NAME)

CM 1

CRN 29654-55-5

CMF C7 H8 O3



IPCI H01M0008-10 [ICM,7]; H01B0001-12 [ICS,7]; C08J0005-22 [ICS,7];  
 C08J0005-20 [ICS,7,C\*]; B01D0071-00 [ICS,7]; C08G0083-00 [ICS,7]  
 IPCR B01D0069-00 [I,C\*]; B01D0069-02 [I,A]; B01D0071-00 [I,C\*];  
 B01D0071-52 [I,A]; B01D0071-76 [I,A]; B01D0071-82 [I,A]; C08G0083-00  
 [I,C\*]; C08G0083-00 [I,A]; C08J0005-20 [I,C\*]; C08J0005-22 [I,A];  
 H01B0001-12 [I,C\*]; H01B0001-12 [I,A]; H01M0008-10 [I,C\*];  
 H01M0008-10 [I,A]  
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 Section cross-reference(s): 38  
 ST fuel cell proton conducting membrane  
 dendrimeric polymer  
 IT Polyethers, uses  
 (dendrimers, carboxyphenoxy or methanesulfonate-terminated,  
 diamine-crosslinked; improved proton conducting membrane  
 from dendrimeric polymers covalently linked into network  
 structure for fuel cells)  
 IT Polymer networks  
 (improved proton conducting membrane from dendrimeric  
 polymers covalently linked into network structure for  
 fuel cells)  
 IT Dendritic polymers  
 (improved proton conducting membrane from dendrimeric  
 polymers covalently linked into network structure for  
 fuel cells)  
 IT Dendritic polymers  
 (polyethers, carboxyphenoxy or methanesulfonate-terminated,  
 diamine-crosslinked; improved proton conducting membrane  
 from dendrimeric polymers covalently linked into network  
 structure for fuel cells)  
 IT Fuel cells  
 (solid electrolyte; improved proton conducting membrane  
 from dendrimeric polymers covalently linked into network  
 structure for fuel cells)  
 IT 107-15-3, 1,2-Diaminoethane, processes  
 (crosslinking agent; improved proton conducting membrane  
 from dendrimeric polymers covalently linked into network  
 structure for fuel cells)  
 IT 2417-72-3DP, Methyl(p-bromomethylbenzoate), reaction product with  
 3,5-dihydroxybenzyl alc. homopolymer, polymers with diamines  
 129371-31-9DP, 3,5-Dihydroxybenzyl alcohol homopolymer,  
 carboxyphenoxy-terminated, polymers with diamines  
 129371-31-9DP, 3,5-Dihydroxybenzyl alcohol homopolymer,  
 methanesulfonate  
 (improved proton conducting membrane from dendrimeric  
 polymers covalently linked into network structure for  
 fuel cells)

## RETABLE

| Referenced Author | Year  | VOL   | PG    | Referenced Work |      |
|-------------------|-------|-------|-------|-----------------|------|
| Referenced        |       |       |       |                 |      |
| (RAU)             | (RPY) | (RVL) | (RPG) | (RWK)           | File |

=====+=====+=====+=====+=====+=====+=====

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October 25, 2010

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|                      |    |                                                                   |  |               |     |  |
|----------------------|----|-------------------------------------------------------------------|--|---------------|-----|--|
| Anon                 |    |                                                                   |  | US 4871779 A  | HCA |  |
| Anon                 |    |                                                                   |  | US 5648186 A  | HCA |  |
| Anon                 |    |                                                                   |  | US 6183914 B1 | HCA |  |
| OS.CITING REF COUNT: | 10 | THERE ARE 10 CAPLUS RECORDS THAT CITE THIS<br>RECORD (10 CITINGS) |  |               |     |  |